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ABSTRACT

This second annual report on student achievement in Illinois describes and synthesizes the results of four different achievement measures: the Illinois Inventory of Educational Progress (IIEP), High School and Beyond Test, Scholastic Aptitude Test, and the American College Test. This report provides an analysis of student progress across years, from basics to advanced skills in reading, grammar, mathematics, science, and for the first time, an analysis of student writing samples from the IIEP. This study was conducted to answer four major questions: (1) how well are Illinois students performing in academic subjects as compared to students in other parts of the nation and the nation as a whole?, (2) how well are the students in 1983 doing in comparison to students of previous years?, (3) how well can Illinois students write?, and (4) what student and school characteristics are related to achievement of Illinois students? (BW)

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STUDENT ACHIEVEMENT IN ILLINOIS:

An Analysis of Student Progress

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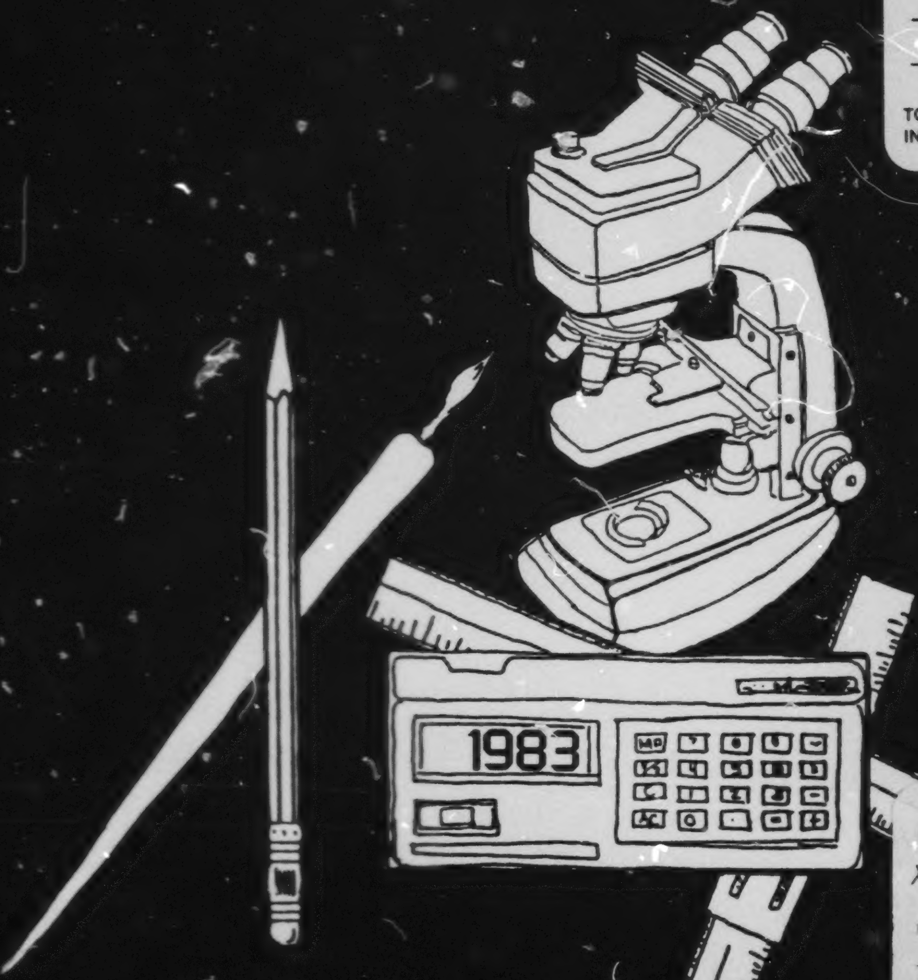

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STUDENT ACHIEVEMENT IN ILLINOIS: AN ANALYSIS OF STUDENT PROGRESS

Illinois State Board of Education

February 1984

FOREWORD

The second annual Illinois Student Achievement report contains analyses of multiple indicators of student progress. The report particularly concentrates on student writing skills measured on samples from the Illinois Inventory of Educational Progress. We hope that this analysis will provide a framework for the continued improvement of local educational programs.

For further information about this document, please contact Dr. Thomas Kerins, Manager of the Program Evaluation and Assessment Section.

Donald G. Gill

Donald G. Gill
State Superintendent
of Education

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STUDENT ACHIEVEMENT IN ILLINOIS:
AN ANALYSIS OF STUDENT PROGRESS IN 1983
EXECUTIVE SUMMARY

Introduction

This is the second annual report on student achievement in Illinois. It provides the State Board of Education and the citizens of this state with a comprehensive picture of the performance of Illinois students in major academic subjects.

A strategy used in the 1982 report was to report about a number of different tests describing student progress at the state level. This approach was consistent with the State Board of Education's 1980 student assessment policy, which encouraged local school districts to develop comprehensive student testing and program evaluation plans based on multiple methods of student assessment.

This report describes and synthesizes the results of four different measures of student achievement. These four tests include the Illinois Inventory of Educational Progress (IIEP), High School and Beyond Test (HSB), Scholastic Aptitude Test (SAT), and the American College Test (ACT). Table 1 at the end of this introduction describes these instruments in terms of the students tested, curricular areas assessed, and overall purpose. In addition, there are references to a Decade Study Test (DST) that was administered to juniors in Illinois in 1970 and 1981. This report provides an analysis of student progress across years, from basics to advanced skills in reading, grammar, mathematics, science and for the first time, an analysis of student writing samples from the IIEP. Since the emphasis this year is on the writing skills of Illinois students, a majority of the data is based on the IIEP.

This study of student achievement was conducted to look at four major questions:

1. How well are Illinois students performing in academic subjects as compared to students in other parts of the nation and the nation as a whole?

2. How well are the students in 1983 doing in comparison to students of previous years?

3. How well can Illinois students write?

4. What student and school characteristics are related to achievement of Illinois students?

Use of Test Information

There are certain limitations in the use of these test results. The tests are generally designed to measure student achievement by use of multiple-choice, paper-and-pencil, objective test items. For example, students are not given a science problem and an appropriate set of materials to solve the problem. The major exception to this is the 1983 writing assessment which is a direct test of the student's ability to write. Even with a direct writing assessment, this test is limited by asking students to respond to a single persuasive prompt or set of directions during a 25-minute time period. Within these limitations, the results based on these assessments are valid and reliable. They constitute an accurate representation of the achievement of Illinois students.

Summary of Findings

The following sections summarize the results in writing, grammar skills, reading, mathematics, and science. In addition, the effects of individual school and student characteristics on student achievement are discussed.

Writing

This is the first year for a writing assessment of Illinois students. Therefore, 1983 will be a benchmark for future assessments; thus, yearly comparisons showing growth of a specific group cannot be shown at this time. Illinois is one of a few states which have pioneered a large-scale writing assessment. This type of assessment is a very difficult and time-consuming project. Since each essay is read and scored more than once, it is a labor-intensive and more expensive testing method than the multiple-choice, machine-scored test. Direct assessment also involves the difficult process of training raters to score papers consistently in order to obtain reliability for large numbers of student papers. The 7,200 Illinois fourth, eighth and eleventh grade student essays were scored by 60 language arts teachers from across the state. Students were rated on their ability to meet the objectives of functional writing by developing points of view, events or ideas in order to convince a reader.

While the major purpose of this assessment was to evaluate the writing ability of Illinois pupils, an important by-product of the writing assessment is in its contribution to helping teachers both in the instruction of writing and the diagnosis of individual student's strengths and weaknesses. Recommendations concerning future action in this area are included in this executive summary.

The analytical scale which was used in the 1983 IIEP clearly defines four specific components of functional writing on a developmental continuum and was used to rate Illinois students' persuasive compositions. The assessment was designed to be a survey of current writing abilities which ranged from underdeveloped to more advanced skills.

Writing Skills Chart

Subskill	Absent 1 2	Developing 3	Minimally Developed 4	Stands Alone 5 6
Focus				
Degree to which main idea or point of view is clear	subject unclear no main point	main point not clear	main point clear	all main points developed
Organization				
Degree to which logical flow of ideas and explicitness of the plan is clear	no plan	plan is noticeable	plan is clear some points signalled by transition	all points identified by transition
Support				
Degree to which main point is elaborated and explained by evidence and reasons	no support	some points elaborated, may be a list	many points elaborated, some second order elaboration	all points elaborated, specific second order elaboration
Mechanics				
Use of convention of standard English:*	many errors cannot read	some major errors, many minor	few major errors, some minor	no major errors, one or two minor

*Usage, sentence construction, spelling, punctuation/capitalization, paragraph format

All students, regardless of grade level, were rated according to the same scale, although sophistication of ideas and vocabulary level was expected to change with maturity. The scale specifies the degree to which the specific criteria for each textual content item (focus, organization, support, mechanics) is present according to the definition within the scale segments (Table 1.1). This kind of scale used across grades allows for useful tracking in both skill development and program effects.

All student writing should contain the basic elements of textual content in order to communicate information and ideas. All students, regardless of grade level, should be able to master these skills with varying degrees of sophistication and use of language conventions. It is recognized that the eleventh grade student has had both the time and opportunity to experience a greater amount of cognitive development than the fourth grader. It logically follows that the younger student's writing ability (as well as other abilities) will not be as developed as that of the senior high school student. This is supported by the self-reported student information on writing required as part of school assignments. Not only was there a significant difference between fourth and eleventh grade student assignments, but at each grade level, students who reported that they wrote more performed better.

In addition to the fact that all students were measured with the same functional writing criteria, it was also possible to statistically ascertain if, given the possible maturity level differences, eleventh grade students are doing as well as they should, in comparison to fourth and eighth grade students. The results of this type of expectational statistical analysis were that eleventh graders did not do as well as they should in any of the four subscales of writing.

It is most useful to view the writing data in terms of the instructional criteria. The scale specifically describes a developmental stage in four contextual components of writing. Information to students on the specific strengths and weaknesses of a composition may serve as both teacher-oriented instruction or as self-checks for students as they write or edit their own papers. Future assessments will provide an opportunity to measure the same grade levels at different points in time or aid local school districts in tracking individual student growth.

The 1983 writing assessment results are summarized below.

- Approximately 73% of the eleventh grade students, 60% of the eighth grade students, and 33% of the fourth grade students met the criteria of developed writing skills as determined by language arts experts. The percentage figures represent students who scored 3.5 or above on a six-point scale. (Students who scored 3.5 or above, Table 1.4)

- Approximately 20% of eleventh grade students met the criteria for writing at the well-developed level of functional writing (Students who scored 5.0-6.0, Table 1.4).

- The use of expectational statistical analysis, with the fourth and eighth grade results as a base, showed that eleventh grade students did not perform as well as expected on any of the four writing scales.

- IIEP survey data indicated that students who wrote more often for either school assignments or personal reasons scored consistently higher at all grade levels.

- Greater percentages of eleventh grade students reported that they wrote more often than either eighth or fourth grade students.

- There was a greater difference in the writing skills between fourth and eighth grade students than between eighth and eleventh grade students.

- There was a significant difference between older and younger students in the types of positions taken in a persuasive essay, the breadth of the persuasive effort, and the type of support they offered for their positions.

- Eleventh grade students were more likely to present and support more than one side of an argument and give more specific examples to support their position.

- Eighth and eleventh grade students who reportedly watched television less than one hour per day performed better than students who reportedly watched television more frequently.

Grammar

On multiple choice tests of grammar skills, Illinois students performed as well as their peers nationally, according to the HSB and the ACT.

While Illinois eighth and eleventh grade students demonstrated recognition of simple grammar skills in multiple choice questions, they did not do as well on IIEP items using more complex sentences. Further, even students who could recognize the correct responses to items using complex sentences showed less skill when actually composing an essay. However, there was some improvement from 1981 to 1983. Illinois juniors in 1983 performed significantly better than juniors in 1981 on multiple-choice items of grammar and usage in complex sentences.

Reading

According to the IIEP, there was a significant increase in student performance from 1982 to 1983 in the ability to read and comprehend lengthy reading passages. Some of this increase may be due to the cohort effect. There were no changes in the ACT and SAT results during the same time period.

Mathematics

With the exception of 1977, mathematics has been tested every year since 1976 by the IIEP. Student achievement in mathematics has improved most years since then. Eleventh grade scores were at their highest level in 1983. Fourth grade performance approached but did not equal its highest level. Eighth grade achievement, while not at its highest level, was significantly higher than the 1976 level. Figure 4.1 displays the IIEP trend data.

Student scores were low in measurement and geometry. Student achievement in factual knowledge and computation was high at all grade levels in comparison to their ability in problem solving.

Science

Illinois students generally performed at the national average as measured by tests for students with college aspirations (ACT and SAT) and the HSB.

Illinois students demonstrated application skills in science as well as recall or factual knowledge at each of the grade levels tested by the IIEP. Student performance improved significantly for the same science items on the IIEP from fourth to eighth to eleventh grades.

Contextual Analysis of Achievement

The achievement of students cannot be understood in isolation. Variables drawn from school and student characteristics may be used to give contextual understanding and meaning to achievement data.

There are three major benefits to be derived from the study of contextual factors on achievement. These are: (1) Information may be obtained to assist districts in the teaching and instruction of their students. Variables such as time-on-task practice in writing in English class, the amount of television watched, and the motives of the students in regard to writing are examples of this type of information. (2) Findings can be given on previously studied variables to establish a more complete information base for the State Board of Education and staff to facilitate proper and appropriate discussions and conclusions. Information on variables such as public versus private schooling and size of school are important for this purpose. (3) Good information may be obtained on new variables which are used in discussions by decision makers in terms of educational policy and the allocation of resources. Information such as the ethnic, income, and course participation rates, gender difference in achievement, and the non-English language background of certain families is important. Some segments of the data are at a preliminary stage of development which suggests the need for caution in drawing premature conclusions. However, over time, these results can influence analyses which may either confirm or deny inferences derived from these data.

- Analysis of the ACT data from 1975 to 1983 and the 1982 HSB results indicated no significant difference in performance of Illinois students attending private or public schools. Reports of major differences in achievement between private and public education were not supported by Illinois data.

- School size has received considerable discussion, especially in regard to student achievement. The IIEP has taken some steps to study differences in student performance on the basis of school size. While not yet controlling for different curriculum offerings or configuration of grades within schools, these data are fundamental to further studies of the relationship between school size and student achievement.

  The results indicated that the performance in fourth grade general mathematics and geometric problem solving, inferential reading comprehension, and writing achievement was lower in schools containing more than 444 students, the largest quartile. At eighth grade, the same pattern emerged in the largest quartile (schools containing 583 to 1,385 pupils) for the same subject areas. However, at grade eleven, students from schools of all sizes had similar levels of performance in all four curricular areas.

- A longitudinal analysis of ethnic differences in achievement by family income indicated that there are consistent differences on the ACT composite score between white and black students at all income levels from 1970 through 1982. However, the more pertinent issue is the amount of decline in achievement experienced by black and white students since 1970 in each income group. Black and white students of low and moderate incomes have experienced similar declines in achievement since 1970. However, black students reporting higher family incomes, experienced only one-twelfth as much decline in achievement as the white upper income since 1970.
- The highest college entrance achievement on the ACT by Illinois students was obtained by students who were white or Asian. On the average, they correctly answered approximately two of every three questions. Black students scored the lowest, correctly answering approximately only one out of every four items on the ACT subtest of mathematics. Their scores have declined from an average of 13.5 correct in 1970, to 10.7 in 1975 and 9.9 in 1982. Recent national research has linked the lower scores of black students to course selections or lack of availability of coursework in certain school subjects such as mathematics.
- On the IIEP, fourth and eighth grade students from families with non-English speaking backgrounds did not score as well as other students in areas of inferential reading and grammar skills. In eleventh grade these students also had lower scores in general mathematics and geometric problem solving.
- On the ACT, the performance by student ability level showed a significant 32 percentage point drop in mathematics achievement from 1970 to 1982 for low-ability students.
- In mathematics and natural science, male students consistently have had statistically higher scores than female students on the ACT subtests since 1972. On writing achievement of the IIEP, the reverse was true. Females scored significantly higher at fourth, eighth and eleventh grades.
- At fourth grade on the IIEP, no significant differences in performance in either verbal or quantitative areas were found in terms of amount of television watched. However, at eighth and eleventh grades, students watching less television performed significantly higher on inferential reading, writing, and mathematics.

Interrelationship among Curriculum Areas

A profile analysis of student performance across all of the IIEP subtests and the writing sample indicated that there is a strong association in the outcomes in each of these areas. The outcomes of schooling in different subject areas were highly correlated. This strong level of association would preclude one subject area being singled out for specific, special emphasis. Study in one subject area facilitates achievement in other subject areas. In particular, writing performance was linked to other non-writing skills such as geometric problem solving, grammar skills, judgment, syntax, and inferential reading ability. The relationship among the achievement levels was higher at eighth and eleventh grade levels than at fourth grade.

Recommendations:

- The Illinois State Board of Education should continue to directly assess student writing. A long-term plan which includes the development of new prompts to analyze different types of student writing should be implemented.

- The State Board should encourage the development of comprehensive writing programs. A state-developed writing manual can be used as an instructional tool for teachers to document specific components of functional writing and to give students pertinent information on their individual strengths and weaknesses. This manual for writing assessment, which is currently being prepared by State Board staff, should be widely disseminated to teachers across the State from kindergarten to the university level.

- In addition to the development of the manual, State Board staff should build a statewide capacity in writing assessment through a training program.

- Students should be asked to write more for school assignments and receive feedback about their strengths and weaknesses in all aspects of writing -- not simply receive a single overall grade.

- There should be an increased emphasis on mental arithmetic, estimation, and applications. The role of problem solving should be given greater importance. Specifically, increased attention should be given to processes by which to attack problems which contain no automatic rules for solution. Real world applications should occupy an important role at all levels and in all mathematics study. Finally, the quantity and quality of experiences with geometry and measurement should be increased for all students at every elementary and junior high school level.

- Further examination of student ability to actually engage in a scientific process is necessary. Just as was found in writing, there may be differences in performance on multiple choice items as opposed to performance on the direct assessment of skills. In science this difference would be between selecting a multiple choice response about scientific processes as opposed to making observations about a scientific process and then applying the results in answering questions. Therefore, the potential of conducting a direct assessment should be examined for future IIEP application.

- Increased effort should be expended to assure equal participation of minority and female students in intermediate and advanced coursework, especially in mathematics and science.
- Teachers and principals should be very sensitive to the special needs and achievement of students from families who have a non-English language background.
- School personnel should continue to inform parents and students about the negative relationship between too much television viewing and achievement.
- Recommendations or decisions based upon the information contained in recent national reports in terms of school size or private and public school attendance should be viewed with caution. Analyses of Illinois school data do not completely substantiate some of the conclusions drawn in national studies.

TABLE 1.
Description of Tests

Test	Subtests	Grade Level	Sample	Purpose
Illinois Inventory of Educational Progress (IIEP) Assessment test administered by the Illinois State Board of Education	Reading Mathematics Science Writing	4 8 11	Random sample of 2,400 students from 120 schools every year in one or more curricular areas since 1976	To assess the knowlege and skills of students on curricular bench marks; chart trends across years; identify factors which may affect student achievement.
High School and Beyond Part of a national survey on student attitudes, perceptions, and achievement which is administered by the National Opinion Research Center, University of Chicago.	Vocabulary Reading Mathematics (I & II) Science Civics	12	1,602 public and 325 non-public Illinois students	To measure the achievement and abilities of high school seniors across the country. State sample was increased in order to make state generalizations.
Scholastic Aptitude Test (SAT) College admissions test	Verbal Quantitative	11 12	Self-selected, college-bound sample of 23,500 Illinois students per year (15% of the total number of high school graduates)	To measure the developed verbal and quantitative reasoning abilities of college-bound students and aptitude for college-level studies.
American College Test (ACT) College admissions test	English Mathematics Social Science Natural Science	11 12	Self-selected, college-bound sample of 101,500 Illinois students per year (66% of the total number of high school graduates)	To measure developed abilities in four curricular areas that are predictive of college performance. A requirement for admissions in most Illinois colleges as well as other Midwest schools.

CHAPTER I: WRITING

Introduction

There are a number of recently published reports which recommend more evaluation of student writing. The Carnegie Foundation study (Boyer, 1983) concluded that writing is the most important, yet most neglected, skill in school and recommended that students should be formally assessed before high school to determine their writing proficiency. The National Council for Teachers of English has suggested that teachers (1) determine student writing skills and a plan for instruction, (2) require students to write, (3) judge the quality of students' writing, and (4) demonstrate that these judgments are reliable.

In December, 1979, the Illinois State Board and the Board of Higher Education Joint Education Committee agreed on the importance of assessing writing skills. The outcome of that agreement was the formation of an external committee of writing experts who made the following recommendations to improve writing skills: (1) more teacher preparation, (2) inservice for all grade levels, (3) curriculum development, (4) research and dissemination, (5) assessment.

In addition to this impetus for a writing assessment, an Illinois State Board report, Student Achievement in Illinois: An Analysis of Student Progress, December, 1982, discussed the results of multiple-choice grammar subtests which were given to high school juniors in 1970 and readministered to the same schools in 1981. The ability of Illinois high school juniors to recognize correct English usage had declined significantly over this time period. However, more information was needed through a sample of actual student writing.

Overview of the Writing Assessment

The Illinois writing assessment was designed to fulfill four related objectives: (1) provide meaningful information for the State Board of Education on how well students can write, (2) use a reliable and valid system to assess student writing, (3) provide information on how writing relates to other verbal and non-verbal skills, (4) provide an assessment method and standard with instructional relevance for individual school districts and classrooms.

Since much of the writing that students and adults use in their school work, jobs and personal business transactions is persuasive and referential, the Illinois assessment's goal was to test students' ability to develop points of view, events or ideas in order to inform or convince a reader. The 1983 assessment measured this type of writing termed "functional writing."

A persuasive prompt (the directions and stimulus to which the student responds) asked the student to agree or disagree with a statement about the benefits of permanently "unplugging the television set." (Appendix A.1)

The use of a single prompt, while somewhat limiting, allows for an analysis of the results across grade levels. Correct use of the assessment instrument requires a student essay to be rated with the same criteria regardless of grade or developmental level. Students had twenty-five minutes to complete the writing task.

The assessment used an analytic scoring system to evaluate student writing. Analytic scoring involves isolating characteristics of good writing and scoring each independently. The Rating Guide (Table 1.1) presents a profile of how well students orchestrate basic elements of clear writing, thereby permitting teachers and policy makers to identify strengths and weaknesses of student writing. Such detailed information can help to focus classroom instruction and policy decisions on writing programs.

The Rating Guide provides a scale that measures four areas of functional writing: 1) Focus--the clarity with which the composition presents a main idea or point of view; 2) Support--the degree to which the main point is elaborated and explained by specific details and reasons; 3) Organization--the clarity of the logical flow of ideas and explicitness of the text structure or plan; 4) Mechanics---use of conventions of standard written English. The scale is criterion-referenced in that criteria of a score category remain unchanged regardless of the quality range of papers or the students' grade levels. (See Appendix A.2 for more detail on each scale.)

Since the Rating Guide focuses on the basics of clear, functional writing, it does not attempt to specify criteria for other, less reliably defined aspects such as originality, depth of thought, voice, style, or quality of penmanship.

Writing Assessment Process

Each element is rated on a six-point scale of skill levels. A score of 1-3 indicates that the skill is absent or only partially formed; a score of 4-6 signals that the skill has been minimally, adequately, or fully developed. A '4' indicates that the composition shows that the student has a grasp of the basic technique, although the skill may need refinement. Papers with mechanics scores of 3 or below receive additional checks which identify specific weaknesses in sentence construction, usage, spelling, punctuation/capitalization and paragraph conventions. (see Table 1.2)

The assessment procedure required two separate scorings of 7,200 student essays. Sixty raters (teachers from across the state) were trained for 1 1/2 days and spent 3 1/2 days on independent scoring. Fourth, eighth and eleventh grade essays were randomly mixed within each packet of ten papers. The average time to rate each paper was about 3 1/2 minutes.

All student writing papers were scored twice with the goal of 80% agreement within one point on each of the five scales, e.g., scorers would not be more than one point apart on the same paper. In addition, there was also an effort to keep the number of 3-4 splits (one rater rates a '4' and another a

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TABLE 1.1

RATING GUIDE FOR FUNCTIONAL WRITING

OVERALL	1. Absent	2. Attempted	3. Developing	4. Minimally Developed	5. Developed	6. Well Developed
FOCUS						* Stands alone
	* Subject unclear	* Subject clear	* Subject clear	* Subject clear	* Subject clear	* Subject clear
	* No main point	* Main point not clear or more than one	* Main point not clear	* Main point clear	* Main point clear	* Main point clear
			Only partially summarizes keypoints actually developed		* Descibes number or type of key points actually developed	* All key points identified/ specified actually developed
				* May have a related beginning and end	* May have a related beginning and end	* Beginning and end relate
ORGANIZATION	* No plan	* Plan attempted, difficult to decipher	* Plan noticeable, can infer	* Plan is clear	* Plan is clear	* Plan is clear
			* Uneven use of transitions * May have few or no paragraphs	* Many major points signalled by transitions and/or paragraphs	* Most major points signalled by transitions and/ or paragraphs	* All major points signalled by transitions and/or paragraphs
	* Almost no logically connected points	* Few logically connected points	* Some logically connected points	* All points logical	* All points logical	* All points logical
			* Some major digressions or excessive elaboration	* Few minor digressions, no major	* Minor digression	* No digressions/ irrelevancies
SUPPORT	* Little or no support or support is confusing support at same level of generality as the main assertion	* Few major points elaborated	* Some major points elaborated	* Many major points elaborated	* Most major points elaborated	* All major points elaborated
	* Redundant/unclear	* May be redundant, may not be precise or clear	* Some elaboration is specific (it may be a list)	* Much elaboration is specific and many points have second order elaboration	* Most elaboration is specific and second order	* All reasons elaboration is specific and second order
MECHANICS/ GRAMMAR	* Many minor errors	* Many minor errors	* Some minor errors	* Few minor errors	* Few minor errors	* One or two minor errors
	* Many major errors	* Many major errors	* Some major errors	* Few major errors	* One major error	* No major errors
	* Very confusing	* Confusion	*			

TABLE 1.2

MECHANICS KEY

	Sentence Construction	Usage	Spelling	Punctuation/Capitalization	Paragraph Format
Major Errors	* Subject/verb agreement * Run-on * Fragment * Omitted words that interfere	* Homonyms - it/it's, their/there, to/two/too * Incorrect use of common words * Incorrect pronoun usage * Unacceptable slang	* Misspelled common words (counted only once, not homonyms)	* Initial caps (not to include run-ons) * Common proper nouns * Ending punctuation * Apostrophes	* Titles used to delineate paragraph * Paragraphs are numbered * Inconsistency of separation convention (either block or indented)
Minor Errors	* Connectors between clauses * Use of "because", "but", "and", "so" to begin sentences * Omitted words that don't interfere	* Awkward or odd use of words/phrases, but meaning still clear * Vague abstract language * Slang generally accepted verbal vocabulary	* Unusual, less frequent words	* Periods for abbreviations * Commas/in a series, for opening phrases or clauses	(Lack of correct paragraph separation is an organization error)

Mechanical errors which could be classified in more than one category should be counted only once (no double jeopardy). e.g. Run-ons count as sentence construction only, not punctuation also. If the same word is repeatedly misspelled or misused, it only counts as one error.

'3' on the same paper) to a minimum. This refers to the scale points that define the '3' paper as one which is "still developing" and '4' which signifies "adequate" functional writing. The papers did not have to be refereed or scored a third time because decisions were not going to be made on individual students. Scores were averaged and all data were aggregated for the state level.

The major strategy of a writing assessment requires teaching raters the scale in order that (1) raters score consistently to the criteria of the scale over time; and (2) two raters score a student's paper within one point of each other on each scale. This requires knowledge and agreement on the application of decision rules for each 1-6 rating on each element (focus, organization, support, mechanics, and overall) of the analytical scale for functional writing.

A major component of the training procedure involved prescoring a pool of representative essays. A panel of experts independently scored papers to be used as training papers and check papers. (Appendices A.3 & A.5) On training papers, raters practiced using the same decision rules to apply scale criteria. Following training, raters scored a set of fifteen pilot papers to qualify for independent rating. The check papers were used to see if the raters were staying on the task of scoring according to the defined scale. During independent scoring, each rater scored a check paper after every ten papers. They then compared their rating of the check paper to a feedback paper which presented the expert scores and a written rationale for each score. (Appendices A.4 & A.6) The training staff used these agreement checks to identify those raters who were scoring inconsistently and who needed additional training.

Many methods have been proposed for analyzing writing assessment data in terms of its quality (rating accuracy, consistency, and scale properties) and its meaning (relationship to curricular areas, performance levels, etc.). The check paper procedure was one of the methods used to measure rating quality. These checks permitted trainers to monitor the scoring by comparing each rater's scores to the criterion scores established by the experts. Results indicate that rater agreement with the twenty-four check papers (within one point) were above the 80% level, with the exception of the Focus scale. The results were: Focus--74%, Organization--86%, Support--81%, Mechanics--85%. Since a good portion of the check papers were "marginal" examples of a score category, the levels of agreement are particularly positive given the challenge of rating papers which require application of difficult decision rules.

A second measure of rating quality is inter-rater agreement (how each rater scored compared with the other person who rated the paper). Percentages of agreement between raters, within one point, were: Focus--76%, Organization--81%, Support--79%, and Mechanics--86%.

Student Results

The results of the writing assessment can be viewed from several perspectives. The first perspective is the performance on each of the four scales of writing. The second is the relationship among the scales themselves. Another is the relationships between student writing ability and other curricular areas. These latter results focus upon correlates with mathematics, reading and language arts. Fourth is the relationship of extracurricular writing activity to academic activity which may be used to increase writing achievement. Table 1.3 presents the results in terms of the average student performance on each writing scale for each grade assessed.

Table 1.3
Average Performance of Students
on Each Writing Scale

Scales	Grade 4	Grade 8	Grade 11
Focus	3.28	3.73	4.05
Organization	2.83	3.57	3.93
Support	2.72	3.49	3.85
Mechanics	2.72	3.45	3.82

The Focus Skill was rated highest across all three grade levels as seen in Table 1.3. Fourth grade students are better able to focus their arguments than support them or use standard English. Eighth and eleventh grade students had similar profiles across the writing scales.

The aggregate means across all four scales are 2.83 for grade four, 3.50 for grade eight, and 3.85 for grade eleven. The differences among these means indicate growth in performance equal to one full scale point from fourth to eleventh grade. Further analyses indicate that growth is equal to one full standard deviation of development in writing skill, or a 36% positive difference of eleventh grade student performance over fourth grade students. From fourth to eighth grade, the increase in performance is 23%. The increase from eighth to eleventh grade is approximately 10 percentage points. This indicates that there is not as much improvement in aggregate performance in writing ability from eighth to eleventh grades.

The percentage of ratings of writing samples can be evaluated in terms of four different segments of the scale. Percentages can be determined for students receiving ratings of 0 to 1.5, 2.0 to 3.0, 3.5 to 4.5 and 5.0 to 6.0. These segments represent absent, developing, minimally developed, and well-developed levels of writing achievement. These results are presented in Table 1.4.

Table 1.4

Percentage of Students at Four Levels of Achievement

	Absent	Developing	Minimally Developed	Well-Developed
		Grade Four		
	0-1.5	2.0-3.0	3.5-4.5	5.0-6.0
Focus	6%	41%	49%	4%
Organization	14%	58%	26%	2%
Support	9%	62%	26%	2%
Mechanics	14%	62%	22%	2%
Average	11%	56%	31%	3%
		Grade Eight		
Focus	1%	29%	56%	14%
Organization	2%	39%	48%	10%
Support	1%	39%	48%	11%
Mechanics	4%	43%	42%	12%
Average	2%	38%	49%	12%
		Grade Eleven		
Focus	1%	19%	57%	23%
Organization	1%	25%	54%	19%
Support	1%	27%	51%	22%
Mechanics	3%	30%	46%	22%
Average	1%	25%	52%	21%

*Numbers may not sum to 100% due to rounding

The results in Table 1.4 indicate that approximately 33% of the fourth graders, 60% of the eighth graders and 73% of the eleventh graders have average scores at the minimally developed level or above (3.5-6.0). At all grade levels, the focus scores are the highest and mechanics, the lowest. Fourth grade students scored almost twice as high on focus as in any of the other scales.

Another aspect of this writing assessment data is the estimated relationship among the writing scales themselves. The intercorrelation coefficients among these four scales were all quite high at each grade level. That is, there is a strong positive relationship between and among the scales. The highest correlations were among the skills of Focus, Support, and Organization. These correlations, as well as the factor analysis results, indicate that the writing results can be aggregated across the scales for each student to produce a writing ability score. By aggregating across all writing scales, one obtains a cumulative indicant of the student's writing potential. Taken together, these scales are quite powerful in describing the student's ability. (No one would even think of measuring math or reading with just one item).

The analytical approach gives information to both the instructional teaching and the evaluation/measurement community. However, each student must be assessed on each scale to get this benefit. This is an important implication for the writing assessment. Students may be taught and evaluated on each of the four scales independently for instructional programs. They can also be given an average total score on writing which can be correlated against performance in other subject-matter areas.

Contents of the Essays

A randomly selected subsample of student papers from all grades was analyzed by three readers in order to determine the method which students used to persuade the reader. Three general categories were used to study the papers:

1) The position taken by the student in respect to a persuasive stance (in favor of unplugging all television sets, opposed, supporting a modified position, equivocal, or indeterminant in stand);

2) The breadth of the persuasive effort (discussing a single side, two sides in a balanced or unequal proportion, or not covering the sides possible);

3) The referential tactics used (personal examples; examples based on observation; examples from public sources such as reports, media, or books; examples stated in general terms, or no examples used).

In many respects the differences in the persuasive efforts are related to grade level. There are fewer differences between fourth and eighth graders and between eighth and eleventh graders than between fourth and eleventh graders.

While a sizable number of students at all grade levels opposed the proposition in the prompt, older students tended to argue a modified position, that is, unplugging the set is acceptable at certain times or until all the homework is completed. Younger students tended to argue only one side of the case, while older students tended to discuss two sides with a greater emphasis on the position they favored. Virtually all students attempted their persuasion through general statements of examples. Younger students more often added an example from their own experience, and older students added examples from reading or the media. Older students may be aware that arguments are more generally persuasive if they include some reference to authority.

Discussion

The 1983 Illinois Writing Assessment is a first step in the development of a continuing assessment program to determine the proficiency of student writing. The use of the analytical model to rate student papers enables both policy makers and classroom teachers to look at the strengths and weaknesses in the major skill areas of functional writing.

One way of understanding the rating scale and the student results of the writing assessment is to look at excerpts from student papers. The focus of the analysis is on whether a student can meet the objectives of clear functional writing.

Students were rated on their ability to express a point of view and maintain that point of view throughout the essay. These examples show at least minimal development of focus. About one-half of the fourth graders were able to meet the criteria for a minimally developed paper by taking a position and maintaining it throughout the paper as shown below.

> "I agree because I think people should get involved in other activities. I think it is wrong to get the wrong ideas about life from television...They use foul language...There are many reasons why children shouldn't watch so much television."

A high school student wrote:

> "I really don't disagree or agree with unplugging all the TV in America...Television could help young people by..........I don't think they ought to watch it all the time......"

Another acceptably "focused" paper from a fourth grader:

> "I agree TV should be unplugged. The children couldn't watch it all the time..."

An example of an eleventh grade paper which does not maintain focus is as follows:

> "Because my homework and cheerleading practice, I don't have a lot of time to watch TV........For me television is relaxing.....There are many educational shows......."

A fourth grade student paper was rated '1' because neither the subject nor the main point was clear.

> "I do the same thing at my TV but sometimes I cannot look at TV because my mom and dad won't let me and sometimes they leave I turn on the TV and look at the lone ranger and........."

Some fourth grade students met the objectives of organizational skills by having a clear plan and signaling some points with transitions even though in many cases these were with the use of "and."

> "I disagree because I love cartoons and all the funny movies and all the specials...and my dad and I like football games...and that's why I disagree.

A more developed eleventh grade paper which rated a "6" in organization uses a number sequence to set off transitions.

> "I agree that unplugging all the TV sets would improve our health, make us more independent and better our education......
>
> First of all, TV affects our health by....... If we watch too much, then .... Also ....
>
> Second, we would become more independent if .... because.......... We would be exercising .... so.........
>
> Third, we would learn more because..............
>
> Therefore, we should unplug..............."

The supporting evidence used by the student was rated by the degree to which the main point was elaborated. The following fourth grade paper is a good example of a composition which does demonstrate the ability to meet the criteria of a minimally developed paper in organization although the student is far from even a minimally developed level in mechanics.

> "I agree T.V. should be unpluged. The children couldn't watch it all the time. If TV. is unpluged they woudn't have anyting to set there eyes on for every hour to watch actors preform then theyed do there homework insted of watching T.V. theyed play and get strong thed start doing exerizes when they get board thed go to bed at a decent hour at night theyed do there schoolwork even better they wouldnt think abought what they would watch when they get home. Also theyed eat more becalse theyed work up an appitite. That makes them tree in one person healtyer, stronger beter in geting eduacated and thats why."
>
> The end

Another example of a minimally developed paper in organization is taken from a fourth grade paper with a better command of the use of standard English.

> "I disagree that we should get rid of TV. There are lots of good shows like 1-2-3 Contact, Sesame Street, and Mr. Rogers that teach us things. Fathers would not be able to watch the news or sports and housewifes would be mad because they wouldn't be able to watch their soap operas. TV is great for a family to get together and watch a good movie."

An eighth grade student used much more general support and failed to give second order elaboration with specific examples to meet the "developing" criteria.

> "I disagree. TV helps people find out what's going on. It shows the weather and also has special educational programs. TV is watched by millions of people each day. I think it would be hard to take all the sets away. It would make kids grouchy and they wouldn't have much else to do but sit around with their homework and twiddling their thumbs."

Another example of a paper which fails to meet "developed support" criteria is shown here. Note that the student begins with saying that, "TV hurts your eyes," but then does not stay with the task of telling the reader why. The student proceeds to tell you what he/she does as opposed to giving reasons for agreement or disagreement with the prompt statement.

> "Watching TV hurts your and my eyes. You can not read very well. So that means your grades drop. And watching TV is bad for your health. I watch TV with my friends. Watching TV is some of my friends hobbies BUT NOT MINE! Watching TV is not really what I have planned when I get home from school. Playing outside is what I have planned when I get home from school. Not watching TV but something I do. But not all the time....."

(See Appendix A.7 for more student examples and A.8 for a '6', well-developed paper.)

Results indicate that while a greater percentage of high school students are able to meet objectives of developed writing, only about one in five meet the criteria for a well-developed paper. Only one in about ten meet this same criteria at the eighth grade. At the fourth grade, the average results are a bit skewed due to the fact that while almost half of the students could write a minimally focused paper, only about one-fourth were able to meet the criteria on the other three scales. Only three percent of the fourth grade students wrote at the well-developed level.

In addition to the fact that all students were measured with the same functional writing criteria, it was also possible to statistically ascertain if, given the possible maturity level differences, eleventh grade students are doing as well as they should, using the fourth and eighth grade levels as a basis for predicting a level of performance. The use of this type of expectational statistical analysis resulted in the finding that eleventh grade students did not do as well as they should have in any of the subscales of writing. This becomes an even greater concern considering the low level of skill ability for fourth and eighth grade students.

The major conclusion is not that more eleventh than fourth grade students are able to meet the criteria of a minimally developed paper, but rather that there are important instructional implications for improving the writing of all students, regardless of grade level. If instructional objectives and subsequent programs were established according to this type of scale, which specifies the important writing components, one may see a greater percentage of all students reaching higher skill levels.

Information from local school districts in other states, as well as results from state assessment programs indicate substantial increases in the second and third years of assessment after major districtwide curricular revision in establishing specific writing objectives.

Another conclusion is that writing is made up of specific components which are all an important part of functional writing. A recent study from the National Writing Project analyzed 72 studies of various methods of teaching writing and concluded that the traditional mode of instruction in which the student acts as a passive recipient of rules, advice, and examples of good writing from the teacher is about half as effective as a problem-solving instructional approach. This includes giving students information and data and then asking them to assume a certain role in how to work on formulating generalizations and using data to "support" their respective roles. The report recommended that teachers not "retreat" to grammar books to teach composition, but rather use the "environmental mode of instruction which involves students with each other in the solution of problems parallel to those they will encounter in writing."

The application of the Illinois analytical scale to this problem-solving instructional mode may provide assistance to teachers at all levels of instruction. The preliminary analysis reveals that even at the eleventh grade, students are experiencing difficulty in written communication. Future activities include the developing and piloting of new prompts in order to determine the utility of the scale with different forms of writing, as well as to chart trends of student performance across time.

CHAPTER II: GRAMMAR SKILLS

Introduction

The 1983 IIEP included a grammar skills subtest for fourth, eighth, and eleventh graders. In addition to test items, the IIEP included a curriculum survey completed by teachers to identify the nature of language arts in practice in Illinois fourth, eighth and eleventh grades (see Appendix B). The High School and Beyond Test contains subtests on Vocabulary, Reading and Writing.

The IIEP

The grammar skills component of the IIEP was administered in fourth, eighth, and eleventh grades in the spring of 1983. Twenty of the test items used in the subtest were included at all three grade levels. These items can be used to make a direct comparison of student performance across these grade levels. Thirty-two additional items were included on both the eighth and eleventh grade versions of the subtest. Those items provide a basis for comparison of performance at those levels and have been grouped by grammar skills and difficulty levels. These include grammatical constructs in simple sentences, grammatical constructs in complex sentences, vocabulary, spelling, and judgment about the appropriateness of sentences in paragraphs.

Fourth grade students were tested in a number of areas where older students were not required to perform on identical items. These included a number of grammar within simple sentence items, vocabulary, punctuation conventions in simple sentences, contractions, and spelling. As a means of allowing interpretation of fourth grade performance, the average performance in each one of these areas can be compared to the average performance of the test as a whole.

The benchmark set by the average performance of fourth graders on the 45-item subtest is 84% correct. Figure 2.1 summarizes these topics as compared to the average performance.

Table 2.1
Fourth Grade Grammar Skills

Above Average	Contractions =	88%
	Grammar and Usage =	87%*
	Spelling =	86%
	Average =	84%
Below Average	Vocabulary =	77%
	Sentences =	67%

*Grammar and usage items are discussed in the text comparing performance across grade levels.

Fourth grade student knowledge of contractions was tested by items such as: "Which two words make up the contraction They're?" Ninety percent of the fourth graders picked "They are" from among four alternatives. All of the questions about contractions resulted in better than 86% correct responses.

Spelling was tested at the fourth grade by two different formats. One format asked students to identify the correct spelling of numbers out of a list of 4 alternatives. More than 95% of the students responded correctly to each of the items in this format. The second format gave students alternate spellings of a word in a sentence located in a paragraph. For example: "We may think of religious holidays or patriotic holidays, but there are other kinds _____." The selection of "too" from among "two" and "to" was more troublesome for fourth graders. The proportion responding correctly for this item was 67%.

Fourth grade students were tested on a number of grammar topics that also were included for eighth and eleventh grade students. These topics included elementary grammar and recognition of complete sentences. Simple sentence grammar included the appropriate form of verbs in simple sentences and agreement of sentence elements. A sample of this type of item is:

Everyday I walk to work, but Bob __________.

A. run
* B. runs
C. runned
D. ran

When given instructions to decide which word or phrase is correct, students were expected to select choice "B." Results for this item showed that a large portion of students at all grade levels responded correctly to this item: fourth = 89%, eighth = 93%, eleventh = 94%.

For grammar in simple sentences, a large part of fourth graders performed well, and most students were knowledgeable about such forms by the second semester of eighth grade. (See Table 2.2)

Table 2.2
Grammar within Simple Sentences
(15 Items)

Grade	Percent Correct
4	88%
8	95%
11	96%

Another set of items tested student ability to distinguish complete sentences from sentence fragments. The format for such items was:

Which group of words forms a grammatically complete sentence?

A. Although two of them tried.
* B. I am tired of television.
C. To support either man.
D. The cheers filling the ball park.

At fourth grade, 66% of the students recognized "B" as the correct answer. It was 82% at eighth grade and 90% and at eleventh grade.

The overall performance results were similar to this for the entire group of items. While fourth graders failed to identify roughly one third of the sentences correctly, the proportion dropped to approximately one fifth at eighth grade and one tenth at eleventh grade.

The test average for each grade level can be used as a benchmark for interpretation of performance results. The following table shows what skill areas are above or below that average. This figure includes five skill areas that were tested to directly compare fourth, eighth and eleventh grade performance. Eight vocabulary items, 5 items about complete sentences, 15 items about grammar in simple sentences, 10 grammar in complex sentences, and 14 judgment items are included in this comparison. Although vocabulary is included in the table for fourth grade, the items are not directly comparable to the vocabulary items used for eighth and eleventh grade.

Table 2.3
Percentages Correct
Language Art Topics
for Grades 4, 8, 11

	4	8	11
Grammar Element within Simple Sentences	88%	90%	95%
Identification of Complete Sentences	--	83%	89%
Vocabulary	--	--	78%
Above Average			
Below Average			
Identification of Complete Sentences	67%	--	--
Vocabulary	*77%	63%	--
Grammar Element within Complex Sentences	**	59%	74%
Judgment	**	41%	52%

* = Fourth grade vocabulary items are not directly comparable to other eleventh grade vocabulary items.
** = not tested

An improvement in correct responses on the concept of complete sentences from fourth to eighth grade and the vocabulary of eleventh graders over that of eighth graders is illustrated in this figure.

Eighth and eleventh graders were tested on vocabulary items which included a stimulus word with five options as definitions. "Reminiscences" proved to be difficult for both eighth (40% correct) and eleventh (66% correct) graders. An easier item for both grades was "cavity" -- 83% correct at eighth grade and 89% correct at eleventh grade.

Difficult grammar and usage items (15) from the Decade Study test were used as a part of the 1983 IIEP. These items were administered both to eighth and eleventh graders in 1983. Those results can be compared with the 1981 Decade Study Test administration. The following figure uses the average for the 15 items to compare results between grades and at different times.

Difficult Grammar and Usage Results across Grades 8 and 11 (N = 15)

Grade	Percent Correct
8 (1983)	59%
11 (1981)	69%
11 (1983)	74%

The results indicate definite differences between each of the groups. High school students performed significantly higher than eighth grade students on these items. Further, there was also a significant improvement in statewide performance at the eleventh grade level between 1981 and 1983.

Judgments are often considered to play a significant role in the act of writing. The IIEP included 14 multiple-choice items designed to assess judgments related to the editing of a passage. (These items correlated moderately, .47, with the ratings of the written samples produced by the same students.) The performance of eleventh graders was significantly higher than the performance of eighth graders on these items.

For example, given a short essay, entitled "The Microcomputer Revolution," students were asked to judge if an underlined sentence or phrase should be kept, taken out, changed, or moved in the essay. In one paragraph, students were asked to recognize that the third of the three following sentences was not relevant given the nature of the essay as a whole: "One of the first of these tasks which comes to mind is to balance the checkbook. Computer programs have been written to help the checkbook clutz. The FBI keeps records of bad checks." While the information may be of interest it is parenthetical to the entire composition and therefore is best deleted.

The ACT

One of the components of the ACT is a subtest on English Usage. This subtest is 75 items in English. It deals with punctuation, grammar, sentence structure, diction and style, and logic and organization in a multiple-choice format. An examination of the results of this subtest shows that while the state average score declined from a high of 20.0 in 1966 to 17.4 in 1975, the averages since that time have stabilized between 17.7 and 17.9. Illinois students planning to go to college scored at the national average on the 1981 administration of the test.

The SAT

State average scores for Illinois on the Verbal portion of the SAT have ranged between 459 and 464 during the years from 1975 to 1983. During the 1983 administration of that test, the Illinois average stood at 462. The national average at that time was 425.

In addition to the Verbal portion of the SAT, special optional tests are available for students in a number of academic areas including English Composition. On the 1983 administration of that subtest, 2,824 Illinois students obtained an average result of 563 compared to the national average of 518.

Discussion

Multiple-choice testing of skills such as punctuation, spelling, grammar, and usage is considered to be an indirect indicator of those skills. The direct test of skills of this sort is through requiring a student to actually do some writing. The correlations between the multiple-choice approach and the direct writing sample obtained in the IIEP suggest that the relationship is moderate. Therefore, interpretation of the multiple-choice test results in this chapter should be tempered when inferring an impact on writing.

The tests reviewed in this chapter included a range of item difficulty and complexity. The results on these tests showed that the skills tested through less complex items or items reflecting only very common knowledge were fairly easy for most students by the end of high school. More complex items were difficult for many students.

Several points of encouragement about performance on more complex items do exist, however. The complex IIEP items comparing students in eighth and eleventh grades showed a significant developmental increment. The performance on these same items in 1981 compared to 1983 also showed an improved outcome for eleventh grade students in Illinois.

For a complete picture of language arts performance, more extensive tests are necessary. Indeed, if the multiple-choice tests are to be interpreted accurately, further direct testing will also be necessary.

CHAPTER III: READING

Introduction

Reading comprehension was measured at fourth, eighth, and eleventh grades by reading passages followed by inferential questions. These reading selections included literature and science subjects in order to simulate the type of reading students are expected to do in their classes. Longer reading passages create more realistic memory demands on students and allow them to use a greater amount of context in responding to questions.

IIEP

These reading questions were also used in the 1982 IIEP assessment, thereby providing the following comparisons.

Table 3.1

Grade	Type of Reading Passage Style/Subject	Average Percent Correct by Passage		
		1982	1983	
4	Expository/Science	36%	44%	(+8)
4	Expository/Science	51%	60%	(+9)
4	Narrative/Literature	45%	61%	(+16)
8	Expository/Science	64%	76%	(+12)
8	Expository/Science	53%	63%	(+10)
8	Narrative/Literature (Great Expections)	37%	52%	(+15)
11	Expository/Literature (Napoleon, Epic Poem)	57%	62%	(+5)
11	Expository/Literature (Antigone)	45%	56%	(+11)
11	Expository/Science	53%	69%	(+16)

The results showed significant improvement in reading comprehension from 1982 to 1983. Fourth grade students scored 8 to 9 points higher on the expository science questions and 16 points higher on the narrative literature selection.

Eighth grade students scored 15 points higher on questions covering an excerpt from Great Expections. In addition, the scores for the expository science reading questions were 10 and 12 points higher in 1983.

Eleventh grade students scored 11 points higher on a passage from the epic poem, Antigone, which has a fairly difficult comprehension level. They also were required to answer questions in an excerpt from Napoleon and scored 5 points higher in 1983. The expository science passage questions averaged an increase of 16 points from 1982 to 1983.

The IIEP results were very positive at all three grade levels. There was a significant increase in student performance from 1982 to 1983 in the ability to read and comprehend lengthy reading passages on both scientific and literary subjects. However, the SAT and ACT tests of verbal ability both indicated no significant change from 1982 to 1983. This was true for students both in Illinois and across the nation.

CHAPTER IV: MATHEMATICS ACHIEVEMENT

Introduction

This chapter summarizes student achievement in mathematics from the IIEP, the HSB, the ACT, the SAT, and the DST. Performance of Illinois students of several age levels and with various achievement levels and college aspirations was analyzed and is reported here.

IIEP Comparisons across Years, Grade Levels, and Curricular Topics

General mathematics is defined as the mathematics studied in grades 1-8, which in today's curriculum includes the topics taught formerly in the first semester of 9th grade algebra and 10th grade plane geometry. Factual knowledge, computation, and application with whole numbers, fractions, decimals, and percents were primarily tested. The items, which were designed to chart mathematical trends for many years, have been used through 1983 and will be used for the foreseeable future. A more thorough testing of mathematics planned for the 1980s is described later in this chapter. This first part of the chapter reports the trends, comparisons across grade levels, and differences among mathematical topics for grades 4, 8, and 11 on the IIEP from 1976-1983.

IIEP Trends across Years

The first year of the IIEP was 1976, and mathematics has been tested every year, except 1977. Since then, student achievement in mathematics has improved. Eleventh grade scores were at their highest level in 1983. Fourth grade performance approached, but did not equal its highest level. Eighth grade achievement, while not at its highest level, was significantly higher than the 1976 level. Figure 4.1 displays the IIEP trend data.

IIEP Comparisons across Grade Levels

Over the years, 14 items were given to both fourth and eighth grade students in the same year, and 56 items were given to both eighth and eleventh grade students in the same year. Eighth graders scored an average of 34 percentage points higher than fourth graders on the items given to both groups. Eleventh graders scored an average of 13 percentage points higher than eighth graders on the items given to both groups.

IIEP Comparisons across Curricular Topics

All test items were geared to the average student. Therefore, comparisons can be made among items and mathematical topics. Comparative results among topics are shown in Table 4.1. As the table illustrates, students showed high levels of knowledge and skill in dealing with mathematical concepts and computation with whole numbers, and moderate ability in handling fractions, application, algebra, and statistics. Students demonstrated the least skill in measurement and geometry, topics which will be explained more thoroughly in the next few pages.

Table 4.1

Performance of Illinois Students in Specific Mathematical Topics Aggregated from 1976-1983 Scores on the IIEP

	Percentages Correct		
	Grade 4	Grade 8	Grade 11
Whole Numbers	75%	67%	86%
Mathematical Concepts	64%	60%	67%
Fractions	--*	68%	63%
Algebra	--	57%	61%
Application	60%	54%	60%
Statistics	--	--	59%
Measurement	44%	44%	53%
Geometry	35%	48%	47%

*Insufficient data

IIEP Plans for the 1980s: Results for 1982 and 1983

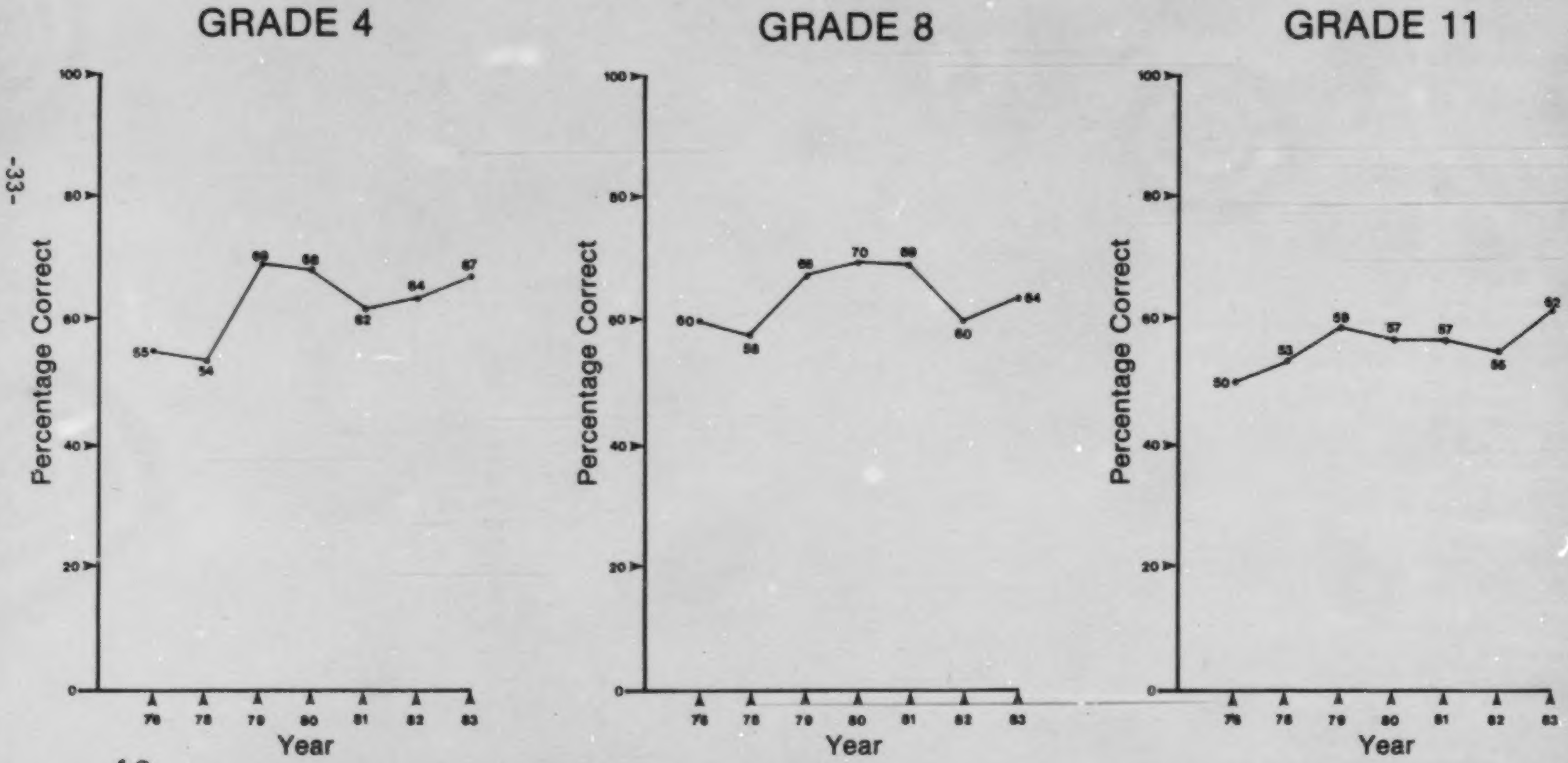
From 1976 to 1980, baseline data were gathered in general mathematics. Once these data were validated, a ten-year plan was developed and initiated, calling for a threefold approach to each year's tests: achievement trends, focus on a specific mathematical topic, and hypothesis testing. The planned topics of focus are mathematical measurement (1982), arithmetic/algebra and geometry (1983), geometry (1984), arithmetic/algebra and mathematical problem solving (1985), problem solving (1986), arithmetic/algebra, statistics and probability (1987), statistics and probability (1988), arithmetic/algebra and technology (1989), and technology, i.e., calculators and computer literacy, (1990). A research component is included for each year's test. Summary reports to the State Board, technical back-up reports, reports to local districts, and articles in journals are part of the plan.

The 1982 tests in mathematical measurement. In accord with the 10-year plan, the 1982 IIEP tests concentrated on mathematical measurement. Mathematical measurement is defined as the determination of the size, capacity, or extent of something by comparing it to an appropriate unit. A three-factor model for mathematical measurement was developed. The factors included 1) attributes to be measured, 2) skills required for successful measuring, and 3) systems of measurement units. The model provided for five types of measurement attributes (length, area, capacity, mass, and temperature), five types of measurement skills (estimation, conversions within a system of units, comparisons between systems, selection/reading of measurement instruments, and routine problem solving), and three types of measurement units (conventional, metric and non-standard). Teacher questionnaires were developed to validate the tests.

Figure 4.1

Illinois Inventory of Educational Progress

Trends in Mathematics



Several results are salient to this report. Student achievement on the arithmetic/algebra items was significantly higher than achievement on the measurement items. Table 4.2 shows the data.

Table 4.2
Student Percentages Correct in
Arithmetic/Algebra and Mathematical Measurement
on the 1982 IIEP

	Grade 4	Grade 8	Grade 11
Arithmetic/Algebra	67.29%	64.16%	61.68%
Measurement	43.39%	44.19%	52.51%

Students scored similarly on the 5 measurement attributes, the 5 measurement skills, and the 3 unit systems. Especially noteworthy is that students did as well on metric items as they did on items of conventional units, despite the fact that students have more in-school and out-of-school opportunities to learn the conventional American system of measurement.

The 1983 tests in arithmetic/algebra and geometry. Just as the 1982 tests emphasized mathematical measurement, the 1983 tests focused on arithmetic/algebra and geometry. Arithmetic/algebra is defined as the concepts, computation, and application of whole and fractional numbers, plus the use of letters or other symbols to stand for numbers. Geometry is defined as the branch of mathematics that deals with points, lines, surfaces, and solids and examines their properties, measurement, and mutual relations in space. Arithmetic/algebra has two components, as does geometry. The arithmetical/algebraic components are arithmetical/algebraic facts and arithmetical/algebraic application. "Facts" as defined here includes computation as well as knowledge of arithmetical/algebraic definitions and facts. "Application" refers to the ability to solve routine arithmetical/algebraic problems by using the knowledge taught in school. The geometry components are geometric facts and geometric application. "Geometric facts" means conclusions that are obvious from inspection of geometric figures as well as basic definitions and facts in geometry. "Geometric application" refers to the ability to solve routine problems by using geometric facts.

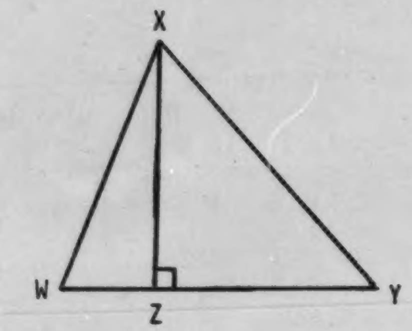
Two typical eighth grade geometry items are displayed in Table 4.3 below.

Table 4.3
Typical Eighth Grade Geometry Items

Geometric Facts

161. What is the altitude of the triangle WXY below?

A. $\overline{WX}$
B. $\overline{XY}$
C. $\overline{WY}$
D. $\overline{XZ}$
E. $\overline{WZ}$



Geometric Application

163. $\triangle$PQR below is an isosceles triangle with PQ = PR $\angle x =$

A. 40°
B. 50°
C. 65°
D. 80°
E. 100°

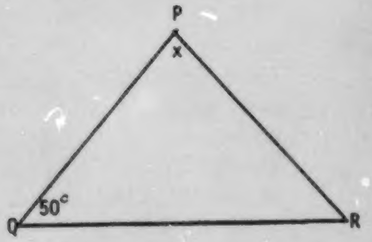


Table 4.4 displays the data for arithmetic/algebra vs. geometry for comparison. The results indicated that achievement was higher in arithmetic/algebra than in geometry at all grade levels.

Table 4.4
Student Percentages Correct in
Arithmetic/Algebra and Geometry

	Grade 4	Grade 8	Grade 11
Arithmetic/Algebra	68.60%	65.76%	66.94%
Geometry	35.25%	46.96%	46.63%

IIEP results indicated that Illinois students had improved from 1976 to 1983 in arithmetic/algebra, but had less skill in mathematical measurement and geometry. Furthermore, at all grade levels students appeared to be least skilled in geometric application. It appeared from the IIEP results and teacher reports that the arithmetical/algebraic parts of mathematics were emphasized more than measurement and geometry.

The Advanced Mathematics of the Decade Study (DST), ACT and SAT

Up to this point, descriptions have been concerned with general mathematics. The IIEP tests in arithmetic/algebra, measurement, and geometry involved the content of elementary school curricula (grades K-8) almost exclusively. The section which follows is concerned with advanced mathematics, defined here as second-semester algebra, second-semester geometry, higher levels of algebra, higher levels of geometry, trigonometry, and calculus. There is considerably less data on advanced mathematics than on general mathematics. According to the State Board project, the Census of Secondary School Course Offerings, the following percentages of high school students have taken the courses indicated: first-year algebra (71%), plane geometry (37%), second-year algebra (15%) and calculus (2%). Achievement data on high school achievement in advanced mathematics are limited to the results of the Decade Study (DST), the ACT, and the SAT.

The Decade Study

Results of the Decade Study which were reported in last year's report indicated that student achievement declined from 1970 to 1981. There are no new results to report from the Decade Study. However, the results led State Board staff to study ACT and SAT data more extensively than before. While there is no indication from the Decade Study as to when during that time the above-mentioned decline occurred, results of the ACT offer a possible indication.

The ACT

ACT scores declined in the late 1960s and early 1970s, and stabilized in the late '70s according to a recent ACT news release. "As was the case for a number of testing programs, scores on the ACT Assessment showed a clearly downward trend from the late 1960s to the mid 1970s. In particular, the average ACT Composite score for college-bound students declined from 19.9 in 1969-70 to 18.3 in 1975-76. Since 1975-76, the average ACT Composite score has varied only slightly, between a low of 18.3 and a high of 18.6."

In the same news release, Dr. Michael Kane was quoted as follows: "It therefore appears, that the very visible decline in the early 1970s ended in 1975-76, and that the general level of performance of college-bound students, as indexed by average ACT Composite scores, has been relatively stable since then."

Illinois students have scored essentially the same as students across the United States on the ACT for the past 10 years. Table 4.5 shows the comparisons for Illinois and the United States from 1972 to 1982. Illinois mean scores were never below the national average during that time.

Table 4.5
Mean ACT Mathematics Scores for Illinois and the United States
1972-1982

	Illinois	United States
1972	20.2	19.1
1973	19.1	18.3
1974	18.1	17.6
1975	17.7	17.5
1976	17.7	17.4
1977	17.5	17.5
1978	17.5	17.5
1979	17.6	17.4
1980	17.6	17.3
1981	17.6	17.2
1982	17.3	16.9

The SAT

SAT scores for the United States as a whole may have dropped in the past 10 years, but scores for Illinois students have remained stable since 1970, ranging from a low of 507 in 1971 and 1976 to a high of 517 in 1982. The scores were 509 in 1970 and 517 in 1982. Table 4.6 shows the scores for Illinois and the United States from 1970 to 1982. At no time during this period have Illinois scores fallen below the national average. Whereas a small proportion of Illinois seniors take the SAT each year, a much larger proportion of students in other states do so. The Illinois sample may be a select group, and comparisons should be made with caution.

Table 4.6
Mean SAT Quantitative Scores for Illinois and United States
1970-1982

Year	Illinois	U.S.
1970	509	488
1971	507	484
1972	509	481
1973	513	480
1974	510	472
1975	509	472
1976	507	470
1977	511	468
1978	511	467
1979	507	466
1980	508	466
1981	515	467
1982	517	468

Perhaps better sources of information for Illinois students than the usual SAT tests are the specialized tests known as SAT achievement tests. Comparisons can be made between Illinois and the United States for students taking the SAT achievement tests in mathematics. It appears that students who take these tests are students with a special interest in mathematics and are representative samples across the United States. Illinois students in this group appear to compare favorably with the top students in the rest of the country. Table 4.7 displays the results for 1983.

Table 4.7
SAT Mathematics Achievement Test Scores

Mathematics Level 1			Mathematics Level 2	
Illinois	U.S.	Score	Illinois	U.S.
%	%		%	%
3%	2%	750-800	26%	16%
7%	4%	700-749	23%	19%
14%	9%	650-699	21%	21%
18%	15%	600-649	17%	21%

Discussion

Illinois achievement in advanced high school mathematics dropped from 1970 to 1981. The pattern is likely to have been a decline from 1970 to 1975, followed by stability from 1976 to 1983. At the same time, there appears to have been a rise in general mathematics achievement from 1976 to 1983.

It also appears that student achievement is higher in the arithmetical/algebraic core of mathematics than in measurement and geometry. The lowest scores are in geometric application. Some of the data in this report are preliminary in the sense that there are few comparison points. Extreme caution is necessary in making any policies based on this data alone. Several hypotheses need to be investigated first.

Panels of mathematics educators, convened by State Board staff, have suggested the following as likely reasons for the results in this report. The basic skills emphasis of the past few years may have helped all students develop competence in general mathematics. The greater emphasis on arithmetic/algebra and lesser emphasis on measurement and geometry probably accounts for the low scores in these latter two areas.

It has been suggested that the standards for high school courses have been lowered. Even though greater numbers of students report taking more mathematics, perhaps they are actually exposed to less mathematics. Another suggestion is that computation and drill are emphasized, while more advanced concepts and challenging problems are omitted. If this is true, it could explain why the average achievement for college-bound students is not as high as some people think it ought to be.

Considerable discussion has occurred across the nation in recent years as to whether student achievement has stabilized after the post-1963 decline or whether it is still declining. Whether there has been a decline or not, it is certain that future generations will need to be more proficient in mathematics than any previous generation. The burgeoning of computers and technology will make skill in mathematics as necessary tomorrow as reading is today. The next generation's skills in mathematics must be sufficient to meet the challenges they will face. The challenge of today's educators is to prepare them.

Recently, the Illinois State Board Mathematics Committee was selected by the Program Planning and Development Department of the Illinois State Board of Education. The Committee consisted of Illinois teachers and scholars representative of all geographical regions and all levels of education (kindergarten through university). State Board staff and the Committee analyzed seven years of IIEP mathematics data as well as data from the High School and Beyond Study, the Decade Study, the ACT, and SAT. They also reflected on research from other sources and their own experience. Synthesis of the data led to several recommended actions.

1. The roles of traditional arithmetic computation should be changed due to the ubiquity of calculators and their use in the world. Specifically, school should:

   Vastly curtail the teaching of long division;

   Decrease time spent on other complicated paper and pencil arithmetic;

   Increase time spent on mental arithmetic, estimation, applications, and developing meanings for all arithmetic being studied.

2. At all levels and in all mathematics study, the role of problem solving should be given greater importance. Specifically, increased attention should be given to processes by which to attack problems and problems with no automatic rules for solution.

3. Real world applications should occupy an important role at all levels and in all mathematics study.

4. The collection, description, understanding, and analysis of numerical information should be studied at every grade level, K-8, and receive major attention in at least one high school course.

5. The quantity and quality of experiences with geometry and with measurement should be increased for all students at every elementary and junior high school level.

Support for these recommendations has appeared in numerous journals and at conferences. Three recent comments of mathematics scholars are paraphrased here for reflection.

Professor Zalman Usiskin of the University of Chicago has proposed that we acknowledge that there are three populations of students: college-bound students with a special interest in mathematics and science, college-bound students with nonscientific interests, and non-college-bound students. A separate curriculum should be developed for each population, with enough flexibility for student transfer from one to another. He further suggests that for most students, seventh and eighth grade mathematics is a needless repetition of computational drills which could be replaced for the most part with some combination of elementary algebra, statistics and probability, and computer-related mathematics (combinatorial mathematics). He proposes that additional mathematics can be taught without additional time being required for it.

Professor Andrew Gleason of Harvard University has said that it is an insult to students' intelligence to make them perform endless computational drills (e.g., long division) when they all know that it can be done with a calculator in seconds. It is no longer important to know how to multiply, but it is very important to know when to multiply. The computer must go into the classroom now.

Finally, Professors Aimee Grieb and Jack Easley of the University of Illinois (Champaign/Urbana) conclude that teachers, especially elementary teachers, must change their approach. The prevalent approach in elementary school is for teachers to explain how problems should be solved, then require students to work problems individually, and finally to mark answers right or wrong, with little specific instruction to bring about student understanding of their mistakes. This approach creates fear of mathematics and distaste for it in many children. Grieb and Easley suggest that primary school teachers should change from a direct teaching of mathematics to a concentration on teaching children how to study mathematics. They should encourage children to think independently, worry less about correct computation, and develop confidence to participate in peer discussion and debate about the mathematics they are studying.

CHAPTER V: SCIENCE

Introduction

Great concern has been expressed about the status of science education in American schools. The intensive case studies of science and social science across the United States conducted in 1976 under the auspices of the National Science Foundation and directed by Robert Stake and Jack Easley of the University of Illinois showed that the imaginative curriculum developed in the post-Sputnick era was not apparent in the classroom. More recently, the National Assessment of Educational Progress (NAEP) results in science were reviewed by Wayne Welsh of the University of Minnesota. The NAEP outcomes were not promising. According to that study, student achievement has generally declined since the first NAEP science assessment in 1977.

Recently a commission sponsored by the National Science Board (1983) and a convocation sponsored by the National Academy of Sciences and the National Academy of Engineering (1983) both concluded that present outcomes of science education are not adequate to meet the future needs of the nation. Authors of the National Science Board report, "Educating Americans for the 21st Century," stated a goal they believed to be attainable: "By 1995, the Nation must provide, for all its youth, a level of mathematics, science, and technology education that is the finest in the world, without sacrificing the American birthright of personal choice, equity and opportunity." The results of the performance of Illinois students on the tests reviewed in this section are a baseline for examining progress toward that goal.

Elementary-Level Science

Information available to the State Board of Education about what elementary school students know in science is limited to one source -- the Illinois Inventory of Educational Progress. Fourth, eighth, and eleventh graders were tested on the IIEP in 1977 and 1981 on life science, physical science, scientific methodology and application. The life science items included questions about plants and animals. The physical science items were about natural laws, electricity, and other phenomena. The items on scientific methodology included questions about experimental process and hypothesis testing. The application items required the student to use knowledge to solve problems.

The IIEP

In 1977, fourth graders performed significantly higher in life science than in physical science averaging 53% compared to 49% correct. In 1981, performance was highest in scientific methodology (51%) and lowest again in physical science (47%). This pattern suggests that at least for the items tested, physical science may receive less emphasis in fourth grade than life science or scientific methodology.

Eighth grade science results from 1977 showed that life science performance (73%) was significantly higher than performance in physical science (69%). The results were reversed in 1981. Physical science performance (70%) was significantly higher than performance in life science (64%) and scientific methodology (67%). Table 5.1 illustrates these results.

Table 5.1
IIEP Performance in Topic Areas (Stated as Percentage)

	Grade 4		Grade 8		Grade 11	
	1977	1981	1977	1981	1977	1981
Life Science	53	50	73	64	89	73
Physical Science	49	47	69	70	65	67
Scientific Methodology	51	51	72	67	77	75

Some educators suggested that schools may emphasize lower cognitive skills in science such as recall to the detriment of advanced skills such as problem solving. The 1981 IIEP included items which allowed an examination of the validity of that contention for Illinois. Results on items dealing with the application of knowledge in physical science and scientific processes, an advanced skill, did not support that hypothesis. Fourth graders did as well on application as they did on other types of items. Eighth graders performed significantly better than average on application skills in physical science. These results suggested that elementary students have acquired advanced skills as well as fundamental ones. See Table 5.2 for the results.

Table 5.2
IIEP Performance in Advanced Science Skills in Application of Knowledge (Stated as Percentage)

Grade	Average for Total Science	Application in Physical Science	Application of Scientific Processes
4	47	45.9	45.9
8	69	73.9	70.9
11	77	80.9	79.3

These results indicate that considerable difference exists between fourth and eighth grade performance. In 1977, the fourth to eighth grade gain was 26 points. On a similar test in 1981 the gain was 22 percentage points.

Secondary-Level Science

Achievement data on high school science is based on the IIEP, the HSB, the ACT, and the SAT.

The IIEP

The IIEP results from 1977 showed that average eleventh grade performance was highest in life science, next in scientific methodology, and lowest in physical science. In 1981, eleventh grade students again scored high in the life science (73%) and scientific methodology (75%). The lowest performance was in physical science (67%). (See Table 5.1)

The SAT

The SAT information used in this report reflects performance on the Science Achievement tests (not the SAT quantitative test) which are designed to provide colleges with information on a student's performance in specific areas of science. Illinois averages were slightly higher than national averages (but not to a significant extent) in biology, chemistry, and physics performance.

The ACT

The American College Test (ACT) Natural Sciences Reading Test contains 52 multiple-choice items dealing with reasoning and problem-solving skills which are converted to a 36-point scale for reporting results. ACT science scores have remained stable since 1970. (See Table 5.3) The highest average during this time was 21.3 in 1973 and the lowest average (20.6) occurred in 1976 and 1978. The range of averages covers only .7 of a point in Illinois. Compared to national averages, Illinois students ranged from .4 above the average in 1972 to .3 below the average in 1978. Since that time, the state and national averages have been virtually the same.

Table 5.3
Mean ACT Science Scores for
Illinois and the United States

	Illinois	U.S.
1972	21.2	20.8
1973	21.3	20.8
1974	21.1	20.8
1975	21.2	21.1
1976	20.6	20.8
1977	20.7	20.9
1978	20.6	20.9
1979	20.9	21.1
1980	20.9	21.1
1981	20.9	21.0
1982	20.7	20.8

Discussion

The pessimism expressed about the status of science education nationally may indeed apply to Illinois. The test results available for this report, which allow comparisons of Illinois students to students across the nation, show that Illinois average results were similar to averages elsewhere. If the national averages are not looked upon favorably by science educators, then the same interpretations would apply to the Illinois results.

While that interpretation may be the dominant one, there are some contrary indications. Illinois students appear to have the ability to apply scientific knowledge in the areas of life science, physical science, and scientific methodology. Those applications are more complex than simple rote recall activities. Furthermore, students seem to get better in those skills as they progress through school.

Greater insight about the science performance of Illinois students will be available in 1984. The nature of science education, student learner characteristics, and comparisons of student performance over time will be investigated in the 1984 Illinois Inventory of Educational Progress.

CHAPTER VI: ANALYSIS AND MEANING OF ACHIEVEMENT

The achievement of students can not be understood in isolation. Certain types of information will add contextual understanding to students' performance. There are three major benefits to be derived from the study of contextual factors on achievement. These are: (1) Information may be obtained to assist districts in the teaching and instruction of their students. Variables such as time-on-task practice in writing in English class, the amount of television watched, and the motives of the students in regard to writing are examples of this type of information. (2) Findings can be given on previously studied variables to establish a more complete information base to the State Board of Education and Board Staff to facilitiate proper and appropriate discussions and conclusions. Information on variables such as public versus private schooling and size of school are important for this purpose. (3) Good information may be obtained on new variables which are used in discussions by decision makers in terms of educational policy and the allocation of resources. Information such as the ethnic, income, and course participation rates; gender difference in achievement; and the non-English language background of certain families are important. Some segments of the data are at a preliminary stage of development which suggests the need for caution in drawing premature conclusions. However, over time these results can influence analyses which may either confirm or deny inferences derived from these data.

Private Versus Public Education

The relationship of private versus public education and student performance has received major attention. This attention is primarily attributable to the publications of Dr. James Coleman whose book, High School Achievement, suggests major achievement differences between the scores of private and public school students. Dr. Coleman chose a national sample of sophomores and seniors and only a subset of all the items on the High School and Beyond battery of tests. Furthermore, Dr. Coleman focused primarily on differences between students in public versus Catholic schools.

For Illinois, a much more enriched data set can be used to study the differences between public and private school outcomes. This is the ACT data for Illinois. These items reflect college-entrance skills, are taken by a large and representative sample of Illinois students can be used to identify any differences due to attending private versus public schools.

Table 6.1 presents the ACT for Illinois in terms of private and public schooling.

TABLE 6.1
ACT Normative Data for Illinois Private and Public Schools

1975 - 1976

	English	Mathematics	Social Studies	Natural Science
Private	17.9	17.9	17.4	20.6
Public	17.3	17.8	16.9	20.7
Difference	0.6	0.1	0.5	0.1

1982-1983

	English	Mathematics	Social Studies	Natural Science
Private	18.5	17.1	17.6	20.5
Public	17.8	17.4	17.1	20.8
Difference	0.7	0.3	0.5	0.3

High School and Beyond Senior Sample Data for Illinois for Private and Public Schools
1982-1983

	Vocabulary	Mathematics	Science	Writing	Reading
Private	13.9	21.2	11.4	13.1	10.8
Public	13.1	21.0	12.2	11.9	10.3
Difference	.8	.2	8	1.2	.5

The results shown in the Table 6.1 indicate that there were no significant differences between private and public high school education in Illinois since 1975. Only minor non-statistical differences between the achievement of Illinois students from private schools and public high schools were seen on the subtests of ACT.

Dr. Coleman's conclusions were based upon analysis of the High School and Beyond results of sophomore students in 1980. The students who were sophomores in 1980 were retested as seniors in 1982. Illinois public and private school students in that sample were then compared this time on all the High School and Beyond test items, rather than on one subset (Table 6.1). No statistically significant differences were found between the outcome performance of students attending public versus private schooling in this 1982 High School and Beyond senior data. Some of the differences noted by Dr. Coleman may be due to his selection of categories of schools for comparison. The ACT data support the finding of a lack of differences between outcomes of public and private education for college-bound students from 1975 through 1983, a time span which encompasses the 1980 timeframe of Dr. Coleman.

Size of School

There has been considerable discussion regarding the association between the size of a particular school and the achievement of students within that school. Dr. Goodlad in his book, A Place Called School, emphasized the issue of school size in his writing of the restructuring of American education. In an attempt to develop an information base for Illinois, we have initiated a study of the association between size of school and resultant student performance.

The schools in the State of Illinois are randomly selected each year to participate in the IIEP testing program. This sampling procedure generates 120 schools each for testing at fourth, eighth and eleventh grades. These schools can then be ranked in "fourths" from the largest to the smallest in terms of size. These "fourths" are known as quartiles and are useful to help standardize comparison of school size across time. The performance associated with each of these quartiles in 1983 for mathematics, reading and writing ability is given in Table 6.2. As can be seen, this classification of schools does not deal with important variables such as curriculum offerings within each school, configuration of grades within the schools, rural versus urban settings, nor the fiscal strengths or weaknesses associated with various school sizes. However, it is a very critical first step at gathering results in a longitudinal effort to relate school size to the outcomes of education.

Table 6.2
School Size Effects on Achievement

Grade Four

School Size		General Mathematics	Geometry Problem Solving	Inferential Reading Comprehension	Writing Ability
Quartile 1	1-235	8.88	4.38	10.39	14.35
Quartile 2	236-337	8.89	4.27	9.98	14.39
Quartile 3	338-444	8.70	4.18	10.28	14.17
Quartile 4	445-1472	8.34	4.04	9.54	13.78
			Grade Eight		
Quartile 1	1-193	14.12	13.46	13.74	17.73
Quartile 2	194-376	14.13	13.19	13.94	17.64
Quartile 3	377-582	14.17	12.67	13.67	17.82
Quartile 4	583-1385	12.80	11.47	12.72	16.70

Grade Eleven

Quartile 1	1-184	12.09	11.25	10.88	19.10
Quartile 2	185-492	12.17	11.30	11.21	19.55
Quartile 3	493-1349	11.88	11.02	10.95	19.14
Quartile 4	1350-3587	12.09	11.34	11.12	19.16

The results indicated that the performance in fourth grade general mathematics and geometric problem solving, inferential reading comprehension, and writing achievement was lower in schools containing more than 444 students, the largest quartile. At eighth grade, the same pattern emerged in the largest quartile for each subject area in schools containing 583 to 1,385 pupils. However, at grade eleven, students from schools of all sizes had similar levels of performance in all four curricular areas. These were the results according to the IIEP, a test of moderate difficulty. Future analyses will include a review of the data to see if these results hold over time. Data from more difficult tests such as the ACT will also be analyzed.

In his book, Dr. Goodlad indicated that the performance of students in elementary schools with less than 300 students and in secondary schools with less than 600 students would be higher than the performance of students in larger schools. The results of the 1983 IIEP supported these propositions for the fourth and eighth grade in Illinois in mathematics, reading, and writing. However, the Goodlad hypothesis was not supported at the eleventh grade. In fact, the results argued for similar levels of performance from students attending high schools of all different sizes. In subsequent analyses, the size of school factor will be reviewed across the past seven years of IIEP and ACT data.

Student Ethnicity

The relationship of student ethnicity to achievement is a critical information source for educational decision making. A compilation of test results from ethnic groups should include the impacts of such socioeconomic variables as family income and parent education. This data procedure is expensive since it involves analyses of thousands of students, classified differentially across different points in time. These socioeconomic by ethnicity analyses were conducted upon the ACT data from students from the State of Illinois. ACT data were reviewed from a longitudinal perspective for each subtest for the years 1970-1971, 1975-1976, and 1982-1983 for Illinois students. These longitudinal data are given in tables in Appendix C.

Before turning to the ethnicity by income tables, the simple ethnic group means alone should be reviewed. These data are presented in Table 6.3. The results by ethnic group given in Table 6.3 reveal relatively stable trends in achievement across the 13-year period. Essentially, the highest achievement was shown for Caucasian and Asian students, lower scores for Hispanic, Mexican American and American Indian students, with the lowest scores for black students. On the 1982-1983 administration of the math subtest as the ACT, black students in Illinois scored only one-half as well (9.9 versus 18.7 and 20.3) as their Caucasian and Asian counterparts. That performance indicated that the black students have answered approximately only one of four items correctly. It should be further noted that there was a continuous decline on the mathematics ACT subtest for the Illinois black students. Their scores have declined from an average of 13.5 in 1970-1971, to 10.7 in 1975-76, and 9.9 in 1982-83. In quite a reverse pattern, the performance of Illinois Asian students has increased across all ACT subtests from 1970-71 to 1982-83.

Table 6.3
Longitudinal Analysis of Ethnic Group Differences of
Illinois Students on the ACT

Mathematics Subtest

Ethnicity	1970-71	1975-76	1982-83
Caucasian	21.3	19.1	18.7
Asian	18.3	19.3	20.3
Spanish-American	15.5	XX	XX
Mexican-American	XX	14.2	12.8
Puerto-Rican, Hispanic	XX	12.0	12.3
American Indian	18.1	15.3	13.4
Black	13.5	10.7	9.9

English Subtests

Caucasian	19.6	18.5	19.0
Asian	15.2	16.2	17.0
Spanish-American	14.4	XX	XX
Mexican-American	XX	14.4	14.7
Puerto-Rican, Hispanic	XX	12.4	14.1
American Indian	16.7	15.5	15.0
Black	12.8	11.8	13.1

Social Studies Subtest

	1970-71	1975-76	1982-83
Caucasian	20.6	18.3	18.4
Asian	15.1	15.9	16.6
Spanish-American	15.0	XX	XX
Mexican-American	XX	14.2	14.0
Puerto-Rican Hispanic	XX	11.5	13.4
American Indian	17.1	14.7	14.2
Black	13.0	10.3	11.6

Natural Science Subtest

Caucasian	22.1	21.9	21.9
Asian	18.6	20.2	20.7
Spanish-American	17.0	XX	XX
Mexican-American	XX	17.5	17.4
Puerto-Rican, Hispanic	XX	15.3	16.6
American Indian	19.1	18.8	17.9
Black	15.4	14.3	14.8

The results from the 1982 administration of the High School and Beyond tests in mathematics and science mirrored the same pattern of achievement results for Illinois students. The highest achievement was by Caucasian and Asian students, middle achievement for Hispanic and American Indian students and the lowest achievement for black students. This pattern was found in both mathematics and science subtests. Similar results were found at fourth, eighth, and eleventh grades for writing achievement on the 1983 IIEP.

The data presented in Table 6.3 can be viewed from two other perspectives. The first perspective is analyzing the achievement results for each subtest by ethnic group by income. A second perspective is to study the exact number of students in each ethnic group by income at each of the three time periods from 1970 to 1983.

The ACT test data were also used to determine the relationship of income and ethnicity to school performance. Recent studies by NAEP have indicated that the achievement of black and white students has narrowed over time. However, that research did not incorporate a major demographic variable, that of familial socioeconomic status. It could well be that the narrowing of this gap could be differentially related to the socioeconomic status of the students. The ACT research grappled with this problem by disaggregating the effect of income by ethnicity on performance on the composite ACT scale. A major secondary benefit to this study was to understand the numbers of Illinois students of each ethnic group reporting different amounts of family income. For each of the years of 1970, 1975, and 1982, the familial income reported by students was broken into thirds (tertiles). This classification facilitated standard comparison across the time periods. Thus, at each time period, income becomes an "effect variable." That is, rather than dealing with specific income amounts, the discussion can be on the effects of high, moderate, or low levels of income on achievement. Those tertile classifications of income for each time period follow.

Table 6.4
ACT Income Ranges over Time

1970	Low income	\$0-\$7,499
	Moderate income	\$7,500-\$19,999
	High income	\$20,000 and over
1975	Low income	\$0-\$8,999
	Moderate income	\$9,000-\$19,999
	High income	\$20,000 and over
1977	Low income	\$0-\$11,999
	Moderate Income	\$12,000-\$23,999
	High Income	\$24,000 and over

For each of these income groups, the ACT achievement data by ethnic group is shown in tables contained in Appendix C.

In reviewing the results of each of these tables, one may note the different numbers of students in each of these categories. For black students in Illinois in 1970, 252 of the students taking the ACT stated that their parents had a high income. In 1975, this number had risen to 450. However, in 1982, 2,131 black students taking the ACT classified themselves in the high income group. The numbers of black students in 1982 in the low and middle income levels were also at least as large in size as the high income group. This indicates that by 1982, a larger number of black students were taking the ACT than in previous years, and a larger number of black students were reporting a higher income than in 1970. In 1970, 5.2% of the black students reported family incomes in the highest level analyzed. In 1982, 22.4% of Black students tested reported family incomes in the highest level.

The achievement data contained in each of these tables can be added and subtracted in various ways to isolate and highlight specific comparisons of interest. One particular comparison would be the performance decline of white versus black students within each income group for 1970 through 1982. This would control for effects of socioeconomic level and ethnic group on comparisons of achievement declines.

An analysis of the actual performance on ACT composite scale of achievement within income level for white versus black students was conducted. The standard scores of white and black students for each income level were subtracted across time to ascertain if there were increasing areas of difficulty or concern in student performance. The results showed that white students in all three income categories scored significantly higher than black students in each income category for each of 1970, 1975, 1982.

However, the more pertinent issue is the degree of performance decline on the ACT composite scale for white students and black students. These findings are presented in Table 6.5. From 1970 to 1982, similar declines in composite performance were noted for white and black students at both lower and moderate income levels. However, at the highest income level, black student achievement declined approximately one-twelfth as much as that for high income white students.

There was a substantial difference in performance on the ACT composite of higher income white and black students in Illinois. No similar dramatic shift can be noted for students in the medium and low income groups. Declines of consistent size are found for white and black students reporting moderate and lower incomes.

Table 6.5
Within-Income-Group
Differences in Performance 1970 to 1982
on ACT Composite Test of
White and Black Students

	White	Black
Low Income	2.21	1.93
Medium Income	2.27	1.63
High Income	1.81	.16

An additional perspective can be given to the ethnic by income differences by looking at the variety of courses taken by the students in each school. Recent national research by Lyle Jones (1983) has linked ethnic differences in mathematics achievement to school differences in the exposure and participation of black and white students in mathematics courses. Higher levels of student performance were associated with higher levels of student coursework for both white and black students. Jones' (1983) research was based upon the test results of 28,000 seniors in the 1980 High School & Beyond test. Similar findings were discovered in an analysis of the National Assessment of Educational Progress data.

Dr. Jones commented on these results:

> The average scores for students who had not taken Algebra I, Algebra II, or Geometry is 47%, while the average for students who had had all three courses is 82% correct for the same mathematics exercises. This is a difference of nearly two standard deviations. The relation of achievement to courses taken is strong and clear. Note, also, the disproportionate representation of black students and white students for differing numbers of years of high school algebra and geometry. About two-thirds of black students, but only 42% of white students, have '0' or '1' of high school algebra and geometry. This difference between black and white students in algebra and geometry course taking might be responsible for a large part of white-black average difference in mathematics achievement scores.

Further analysis by Jones showed that when scores were adjusted for courses taken, the difference in unadjusted scores between whites and Blacks and between whites and Hispanics were reduced to practically nothing. These results have major implications for ethnic differences in achievement and for action to reduce these differences. These results suggest that ethnic differences in achievement are a function of participation rates in courses of study by black versus white students. Reduction of performance differences may be tied to increasing coursework availability and opportunity to participate in these courses in schools with high concentrations of minority students.

Students of Non-English Speaking Background

In order to assess the relationship between students of families of non-English speaking background and achievement, the 1983 IIEP asked students if English were the language spoken most often in the student's home and how often a language other than English was spoken in the home. The results given in Table 6.6 indicate the magnitude of the difference between students in homes where English is the primary language and those where it is not. The impact of this at the fourth grade can be seen most clearly in inferential reading. At eighth grade, the largest differences are in basic mathematics and geometric problem solving. By the eleventh grade, the impact has become generalized across mathematical and verbal skill areas.

Table 6.6

Relationship of Familial Lingualism with Student Achievement
"Is English the Primary Language in the Home?"

	General Mathematics	Geometric Problem Solving	Inferential Reading	Writing Ability
Grade Four				
Yes:	8.98	4.39	10.53	14.44
No:	7.93	3.65	8.37	13.41
Difference:	1.05	0.74	2.16	1.03
Grade Eight				
Yes:	14.01	12.04	13.67	17.61
No:	12.10	10.92	12.06	16.06
Difference:	1.91	1.12	1.61	1.55
Grade Eleven				
Yes:	12.20	11.37	11.14	19.38
No:	9.49	8.76	9.19	16.65
Difference:	2.71	2.61	1.95	2.73

Student Cohort

In the previous chapters of this report, relatively substantial achievement gains were noted in reading and mathematics in 1983 on the trend anchor test items (which were used each to statistically equate the present test to the preceding assessments) as compared to previous assessment years. A refined analysis across the profile of results from 1976 to 1983 for each of fourth, eighth, and eleventh grades, indicated that there may well be a cohort effect in the assessment data. A cohort is defined (Schaie, 1965; Baltes, 1968; Nessleroade, 1972; Goulet and Baltes, 1970) as a group of students who enter school during a particular year. For example, a cohort is that group of students who entered eleventh grade in 1983. A similar cohort would be those students who entered eighth grade in 1983. These cohort groups of students can be traced to study their differential performance across time. A cohort effect in performance occurs when that particular group of students, when compared across time, perform homogenously and in a particularly different fashion to other groups of students. The cohort effect for the IIEP may be described in the following manner. The students in eleventh grade cohort in 1983 were in eighth grade in 1980. It should be noted that these students as eighth graders in 1980 performed higher than other eighth grade students measured by the IIEP. A similar discovery is found for those students in the eighth grade cohort in 1983. These students were in the fourth grade in 1979. That 1979 class of fourth grade students performed higher on trend anchor items than other cohorts of fourth grade students. Thus, increased gain in achievement shown on the 1983 IIEP may be partially attributable to the prevailing high performance of these two cohort groups of students.

Student Ability Levels

In the previous section, the student population was divided into cohorts defined as aggregate groups of students who entered a certain grade at the same time. However, the population of students can also be divided into other aggregate groups on the basis of each student's ability level. Recent national analyses of achievement data by Dr. Diane Ravitch and the National Assessment of Educational Progress have focused upon performance differences of students with varying levels of ability. It has been suggested in this national debate that the declines noted in overall student achievement in mathematics and natural science may be attributable to specific subgroups of students if classified by their ability level. To examine this issue in Illinois, students were grouped on the basis of student ability. The achievement of the students within each group was compared. These subgroups of similar ability students can be traced historically to note any trends in achievement associated with levels of particular abilities. Table 6.7 presents the performance on the ACT subtests by each student ability group for 1970-71, 1975-76, 1981-82, and 1982-83. These years were chosen as benchmarks to summarize data across the past 13-year time span. The results indicated that there has been no evidence of change in the achievement in natural science of college-bound high school students in any quartile of ability in the past thirteen years. However, in mathematics, a dramatic difference of 4.8 standard score points was noted for the lowest level of student ability from 1970 to 1982. That 4.8 standard score difference represents a 32% drop in achievement for the low-ability students from 1970 and 1982. Groups of students representing all other ability levels did not experience the dramatic decline which occurred in mathematics performance.

Table 6.7

Illinois Trends in ACT by Ability Quartiles

Mathematics

Quartile	1970	1975-76	1981-82	1982-83
Lowest	14.8	12	11	10
Second	20.0	17.5	18	18
Third	26.8	24.5	24	24
Highest	34	33	34	32

Natural Science

Quartile	1970	1975-76	1981-82	1982-83
Lowest	16.4	15.5	16	16
Second	20.6	20.4	21	21
Third	26.5	25.8	26	26
Highest	33	33	33	33

Gender Differences

Differences in performance between male and female students have been the center of study for a long time. The ACT and HSB results are used here as one basis for male and female comparisons in mathematics and science.

The results on the ACT from 1972 through 1982 showed an average difference of 2.78 standard points between male and female students on the ACT mathematics test. The largest differences were 3.1 standard points between male and female students in 1975 through 1977. Since that time, the difference between the male and female students, while significantly apart, has begun to narrow.

The differences between scores of male and female students on natural science varied from year to year. The smallest difference between male and female scores was 1.7 points in 1972. The largest difference was 2.7 points in 1975-76. Since 1978, the ACT difference between male and female students in science is becoming wider.

The gender differences on the High School and Beyond showed a one-point performance difference between the achievement of male and female students in mathematics and science, but due to the sampling design of the High School and Beyond, this difference was not statistically significant.

Significant gender differences in performance were also found on the scale of writing achievement. At fourth grade, female students had an aggregate writing scale rating of 14.52 as compared to 13.91 for male students. At eighth grade, females students scored 17.76 and 17.19 for male students. At the eleventh grade, the average writing scale score for female students was 19.85. For eleventh grade male students, the average aggregate writing scale score was 18.59. There was an increase in the difference between male and female writing performance at the eleventh grade.

Television Viewing

A major issue in student achievement research has been the effect of the amount of time students spent watching television. The High School & Beyond research identified the large amount of television viewing by the students. However, that research did not link that viewing to effects on student achievement. Questions were included on the 1983 IIEP to study the correlation between magnitude of television watching and student achievement. Students at fourth, eighth, and eleventh grades were asked, "About how many hours a day do you watch TV?" The students could respond from "more than four hours" to "less than one hour" per day. At fourth grade, no significant differences were found between the magnitude of televison watching and mathematics performance on general mathematics or geometric problem solving, inferential reading comprehension, or aggregate writing achievement. At eighth grade, there were significant differences. On the average, the eighth grade students who reported spending less time viewing television had higher scores on general mathematics, geometric problem solving, inferential reading and aggregate writing achievement than other students. There was the same pattern at eleventh grade.

Instructional and Extracurricular Activities and Writing Activity

Certain activities and practices in the school may influence student achievement. With regard to writing achievement, there are certain time-on-task activities such as the frequency of actually writing or writing projects in school which may relate to increased writing performance. The IIEP contained a questionnaire using three questions adopted from a national study of writing (Applebee, 1982). These three questions were: How often do you write for your own purposes (letters, stories, poems, journal other than for school)?; How often do you write one or more paragraphs as an assignment for English class?; and How often do you write one or more paragraphs as an assignment for classes, other than English class? The students could respond to these items from a position of "rarely or never" to a position of "three or more times a week" and "just about every day."

A significant difference on writing achievement was found in terms of frequency of writing for one's own purposes for all three grade levels. Students reporting less frequent writing (rarely or never) received a significantly lower aggregate rating than students writing once or twice a week or even once or twice a month. In terms of writing paragraphs for English class, students who stated that they rarely were assigned such writing tasks received a significantly lower score than students assigned to write a paragraph for English class once or twice a month or once or twice a week. Finally, those students who reported rarely or never writing outside English class received a significantly lower rating than students responding once or twice a month. These data suggest a positive relationship between high levels of writing performance and student practices of writing for assignments in classes and personal-related writing.

Perceived Utility and Meaning to Writing

If increasing personal efforts at writing will increase proficiency at writing, it is important that students perceive a utility and value in writing to fuel their persistance in writing practices. Longstanding and systematic research on achievement and productivity in curricular areas other than writing (cf. Maehr & Nicholls, 1980; Triandis, 1980; Fishbein & Ajcen, 1978) have shown that a student's motivation to perform well on an educational task is related to how meaningful that task is perceived in terms of the student's expectations and values. A major contribution of Dr. Goodlad's book on schooling indicated that it is the factors such as student perception and expectation which account for differential achievement and excellence.

Those expectations and values can be evaluated for writing in terms of three distinct perceived utilities (Feather, 1980; Elig & Frieze, 1980; Nicholls, 1982; Maehr, 1983). First, writing could be perceived to be good instrumentally in getting good grades or obtaining teacher approval. Second, writing could be perceived to be good intrinsically for learning to express oneself or being fun to do in and of itself. Third, writing could be perceived to be valuable for social comparison purposes such as to impress one's peers and friends. Knowledge of how each of these perceived meanings relate to writing helps identify how students interpret the task of developing competence at writing and how to communicate successfully with them to facilitate that development. The results from the IIEP indicated that students, at both the eleventh and eighth grade, who perceived writing to be important for intrinsic, personal benefits, had the highest level of writing achievement. Those students who thought that good writing was for the purpose of social comparison achieved the lowest levels of writing performance. The perception of writing instrumentally to obtain good grades and teacher approval was associated with moderate levels of student achievement. These data, as well as results from correlational analysis, point to the fact that students who perceive a personal benefit from good writing are those who may write better due to increased levels of persistance and practice.

Correlation among the Academic Areas Assessed

The outcomes of schooling in different subject areas are highly correlated with each other. The strong level of association should preclude one subject area from being singled out for specific special emphasis. Increases in study in one subject area facilitate increases in other subject areas. Furthermore, certain skills such as writing achievement can be shown to be composed of performance in several verbal skills (inferential reading and grammar) and quantitative skill (geometric problem solving) areas. For this purpose, a study of the intercorrelations among all the achievement subtests was conducted for the IIEP.

One of the major issues faced by educators was the nature of the interrelationships between subject-matter areas. If a comprehensive understanding of student performance was required, then the association of achievement in one area such as inferential reading to another area such as geometric problem solving had to be identified. The major focus of the IIEP was to look at the relationship of writing achievement to other academic areas. To obtain this information, correlative analyses were run between writing achievement and all other subtests scores in the IIEP. The results were clear. There was a great deal of association between the performance of a student on one IIEP subject matter subtest and other IIEP subtests. This interdependency was higher at grade eight and grade eleven, with less association between the subject matter areas at grade four.

An example of this interdependency can be given from eleventh grade. For mathematics, the correlation between performance on general mathematics and that on geometric problem solving was .76. General mathematic skills also correlated .58 with inferential reading skills. Writing ability was most highly associated with performance on complex syntactical grammar items (.51), editorial judgment skills (.48), inferential reading (.48), and vocabulary knowledge (.44). Writing ability was also correlated with the mathematical skills of general mathematics (.48) and geometric problem solving (.45). At eleventh grade, inferential reading correlated highest in language arts with vocabulary knowledge (.50), performance on complex syntactical grammar skills (.58), and editorial judgment skills (.56).

At fourth grade, there was a smaller correlation among subject matter areas. The highest correlation with writing achievement was inferential reading (.43) followed by skills of identifying complete sentences (.37), performance on grammar items (.35), and punctuation skills (.32). At grade four, writing achievement correlated with general mathematics (.34) and with skills in geometry problem solving (.27). These two subtests of mathematics correlated (.43) with each other at fourth grade. Inferential reading associated with general mathematics (.52), identification of complete sentences (.51), grammar ability (.47), and vocabulary knowledge (.37).

Taken together, these data indicated a strong degree of association between the performance on any one subtest and other subtests. Thus, the achievement outcomes of schooling in many subject-matter areas were correlated. More importantly, they suggest that writing performance is composed and linked to other non-writing skills such as geometry problem-solving skills, judgment skills, syntactical skills, and inferential reading ability. A desire to increase writing ability of students can take into account increased instruction on these non-writing subject matter areas.

APPENDICES

APPENDIX A

WRITING

APPENDIX A.1

1983 WRITING PROMPT

ILLINOIS INVENTORY OF EDUCATIONAL PROGRESS

DIRECTIONS FOR THE WRITING ASSIGNMENT

In the first part of the test you will write on an assigned subject. The subject is described on the next page. You will have about 25 minutes to do the assignment.

You should have enough time to think a little before you write--you may want to make some notes or a list of ideas before you start. As soon as you have your ideas in mind, begin to write. You should write so that someone who does not have a copy of the assignment will understand what you are writing about. Turn the page and read the assignment.

ILLINOIS INVENTORY OF EDUCATIONAL PROGRESS

Writing Assignment

It always strikes me as a terrible shame to see young people spending so much of their time staring at television. If we could unplug all the TV sets in America, our children would grow up to be healthier, better educated, and more independent human beings.

Do you agree or disagree? Explain and illustrate your answer from your own experience, your observations of others, or your reading.

Appendix A.2
Description of the Scale

ELEMENT 1: FOCUS

This element examines whether the subject or topic of the composition is clear. It also assesses whether the paper explictly summarizes the main idea or point of view about the subject that is developed in the paper. The most sophisticated paper will announce in its opening lines the subject, main idea or view, and the subtopic that will be developed. The paper will also review key points in a conclusion. Less well developed papers may leave the reader to infer the main point or may develop several distinct points without typing them together in a general statement or set of statements.

6--The essay can stand alone.
The subject is clear.

The main idea or view is stated.
The key points or subtopics that are developed are specifically named.
Opening and closing statements match or logically relate to the text and to each other.

5--The subject is clear.

The main idea or view is stated.
The general number or type of key points or subtopics are mentioned.
Opening and closing statements may relate to follow from each other.

4--The subject is clear.

The main idea or view is stated.
There is no attempt to specify points that are developed.
The beginning and end may relate, but do not contradict each other.

3--The subect is clear.

Opening or closing statements may specify more or fewer points or subtopics than are actually developed in the paper.
The reader must, but can, infer the main idea.

2--The subject is still clear.

There may be more than one main idea developed.
The reader must work very hard to infer a main idea.

1--The subject may be unclear.

There is no discernible main point.

ELEMENT 2: SUPPORT

This element focuses on the quality (specificity and amount) of the support elaborating the essay theme. Support provides additional information about a general point. Supporting details are more specific than the generalizations they are intended to develop. Such details elaborate or flesh out and explain the main idea and subtopics through description, example and reasons. The quality of support depends on depth, specificity, accuracy and amount.

Depth of elaboration can be determined by diagramming details provided in descriptions or reasons in an outline or tree format. The more subtopics or branches, the greater the depth of elaboration.

Specificity is a means of judging accuracy and credibility. More concrete details or reasons enable the reader to judge whether statements are factual or widely accepted assertions. Generalizations, assertions and opinions must be backed up.

The amount of support also influences the score. Support scores for longer essays will depend on the proportion of points or subtopics elaborated by more specific detail and reasons. Obviously shorter essays will have fewer opportunities to develop and back up main points.

6--The essay's main idea or view and all major subtopic are elaborated and explained by specific detail.

5--Most major points are elaborated.

Most elaboration is specific and second order.

4--Many major points are further elaborated.

Much of the elaboration is specific.
Much of the elaboration is second order.

3--Only some major points are elaborated.

Only some elaboration is specific. It may be a list.

2-- Support is attempted, but few major points are elaborated.

Little of the elaboration is precise or clear.
The support may be redundant.

1-- There is little or no support.

Support is very confusing or at the same level of generality as the point it is intended to develop.

ELEMENT 3: ORGANIZATION

This element examines whether the composition exhibits a clear structure or plan of development and whether the flow of ideas is logical. The essay's organization has a "vertical" dimension evidenced by the use of paragraphing and transitions to signal the relationship of points to the main idea. The essay's organization also has a "horizontal" dimension evidenced by the connection of one sentence to the next. Fully developed essays will use paragraphs and transitions to signal the plan or text structure. They will also use pronouns, demonstratives, definite articles, conjunctions, repetitions of words, and synonyms to cue horizontal relationships.

Less well developed papers will fail to use paragraphing or will use it inappropriately. These papers may also use few cohesive ties or transitions to cue the logical relationships. Some weak papers may have digressions or the train of thought may resemble stream of consciousness or free associations.

6--The essay plan is very evident.

The plan is signalled by the division of major points into distinct paragraphs.
The plan is also signalled by use of transitions.

5--The plan is clear.

Most major points are separated into paragraphs and signalled by transitions.

All points are logically developed and related to each other.
There may be a few minor digressions, but no major ones.

4--The plan is clear.

Many major points are signalled by transitions and developed in paragraphs.

Most points are logical.
There may be a few minor digressions, but no major ones.

3--The plan is noticeable, but the reader must infer it.

Only some major points are signalled by transitions.

There are some logically connected points.

There may be some major digressions.

2--A plan is attempted, but the reader must work very hard to infer it.

There are few or no transitions signalling major points.

There are few logically developed points.

1--There is no evidence of a plan.

Almost no points are logically related.

ELEMENT 4: GRAMMAR/MECHANICS

Errors in grammar or mechanics should be weighted according to how seriously they interfere with communication. A gross error, such as a run-on sentence or a sentence fragment, makes it difficult to understand the writer's message. A statement such as, "Tomorrow, I went to the store," also confuses the reader by obligating him to decipher which time context -- future or present -- the writer actually intends. By contrast, a minor error does not seriously interfere with the writer's message. For example, in the sentence, "He going to the store now," the message is clear but the grammar is incorrect. An overabundance of minor errors, however, may seriously detract from the reader's understanding. The intent in this element, is to evaluate errors in relation to how much they interfere with the writer's effectiveness in communicating rather than to attempt to assign different values to the myriad of possible grammatical and mechanical errors that can occur.

6-- There are few or no minor errors. There are no gross errors.

5-- There may be a few minor errors, but no more than one gross error.

4-- There are a few common errors. A few may be gross.

3-- There are numerous minor errors and some gross errors. Sentence construction is below mastery.

2-- There are many gross errors, causing some confusion.

1-- Errors are so numerous and serious that they interfere with communication.

Examples of Mechanics/Grammar Errors

No Double Jeopardy on Errors

	GROSS	MINOR
Sentence Construction	. tenses . run-on . fragments . subject/verb agreement	. connectors between clauses . "of", "but", "and", "so" (to begin sentences)
Usage	. incorrect use of common words . mixing languages . homonyms (its/it's, their/there, to/too/two) . pronoun reference	. awkward usage, but meaning clear . vague, abstract language
Spelling	. common words (not including homonyms) . misspellings that impede communication	. unusual words

Only one error counted even if misspelling repeated.

	GROSS	MINOR
Punctuation/ Capitalization	. end punctuation missing (not including within run-ons) . apostrophes in contractions . commas missing so communication impeded . initial capitals (not including run ons) . common proper nouns	. commas in series or after introductory word groups . periods for abbreviations
Paragraph/ Format	. titles . numbers . inconsistent method of separation . no method of separation	. use of spacing instead of indentation (as in business letters)

APPENDIX A.3

Training Paper 1

I disagree strongly. I watch alot of television, and I think that I am very well educated. I think that television has alot to offer in terms of education. If you unplugged all of the T.V. sets in America, the only source of information for Students would be: textbooks, and radio Which in my opinion is not enough You would be cut off from the recent things happening in the world today. You wouldn't be in touch with the outside world. You would be confined in a sort of way. I think people should watch some television at least every-day. But you should

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get the better of your education at school.

Some networks have separate educational channels, which I think is a *very* good idea. They have some very interesting programs.

If you cut off T.V. you wouldn't be able to watch *live* events. Most of those *are* educational.

I think the television is an excellant invention

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APPENDIX A.4

TRAINING FEEDBACK

Code Number Training Paper 1

ELEMENT	RATING	COMMENTS
FOCUS	6	The position is clear and the main reason, "television has a lot to offer in terms of education" describes the points made.
ORGANIZATION	3	Some points are logically developed, but some points are unclear. There are too many one-sentence paragraphs.
SUPPORT	3	Many reasons are general statements or opinions that need to be backed up. "You would be cut off from..."
GRAMMAR/MECHANICS	3	Two incomplete sentences. Pronouns keep shifting person, several usage problems.

Mechanical Skills below mastery

X Sentence Construction

X Usage

______ Spelling

______ Punctuation and Capitalization

______ Paragraph Format

APPENDIX A.5

Check Paper 1

I disagree, because I think people can learn from television. There are many television shows nowdays that educate a lot of people, especially the younger ones.

I some ways, I do agree though because besides the educational television shows there are are the ones that have too much violence. So, I think that instead of unplugging all of the TV sets in America we should take off the shows that have too much violence, and put on the ones that are more educational.

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APPENDIX A.6

FEEDBACK SHEET

Code Number Check Paper I

ELEMENT	RATING	COMMENTS
FOCUS	6	Last sentence summarizes the points made in the composition.
ORGANIZATION	4	The two points are in separate paragraphs. Uses "though" and "so" to signal the logic.
SUPPORT	2	Support is vague "many shows that educate a lot of people..." "too much violence".
GRAMMA[illegible]HANICS	5	A sentence error probably due to copying the first draft incorrectly, a few minor errors.

Mechanical Skills below mastery

_______ Sentence Construction

_______ Usage

_______ Spelling

_______ Punctuation and Capitalization

_______ Paragraph Format

APPENDIX A.7

EXAMPLES OF SCORE POINTS FROM STUDENT ESSAYS

ELEMENT 1: FOCUS

6-- Example #1

Unplugging all the TV sets in America would not make our children grow up healthier, better educated, or more independent human beings...

There are many educational shows on TV such as...............

TV also teaches us how to take care of our bodies................

TV does not make us less independent....................

So unplugging the TV will not make us better educated, healthier or more independent.

Example #2

I disagree that we should get rid of TV because we can learn a lot from TV...................

Children learn to count by watching......................

Grownups learn about the world by watching the news..................

TV really has many educational programs............

If you unplug the TV we will not learn as much.

5-- Example #1

I agree that we could be doing many other things besides watching TV all the time..................

We could exercise and ....

If TV were gone, children would go to the library and some would play ball...................

So that's why children shouldn't watch so much television........

Example #2

I do agree with this theory to some extent, but I also disgree.......

Television is not all bad..........................

But people without television are much healtnier both mentally and physically.

4-- Example #1

I really don't disagree or agree with unplugging all the TV in America.....Television could help young people by............... I don't think they ought to watch it all the time............

Example #2

I disagree with what is said................................

Example #3

Television is a harmful thing...............

Example #4

I disagree because I enjoy watching TV......................

3-- Example #1

Because my homework and cheerleading practice, I don't have a lot of time to watch TV.............For me television is relaxing....... There are many educational shows...............

Example #2

I agree, but I also like to watch television. And I like to read. There are good television and there are bad ones...............

Example #3

Television makes us healthier and better educated.......... Sesame Street teaches.............. From the news................. I watched the space shuttle................ Sc don't unplug the TV.

Example #4

I disagree. Television teaches us many things. There are shows on how to cook..........Sesame Street helps.................I am more independent because .... and I am healthier too.

2-- Example #1

I agree because.....................................

I also disagree.....................................

Example #2

I disagree because some people don't care about their body...and we should not be here now if there weren't no television... children run the street a small amount of people talk to television... they would start to play education movies on your TV set.

1-- I do the same thing at my TV but sometimes I cannot look at TV because my mom and dad won't let me and sometimes they leave I turn on the TV and look at the lone ranger and ....

ELEMENT 2: SUPPORT

Examples of Score Points from Student Essays

6-- Example #1

I don't think that unplugging the TV will make me healthier or better educated.

I learn a lot from television. I watch the educational shows about science on channel 7. I learned how to save a life from watching an emergency show. I learn about the world from the news.

There are exercise shows on TV that help you get strong muscles. There are also shows on how to cook and eat healthy food.

Example #2

I agree with the statement given. I believe kids spend too many hours in front of a television set. Their eyes will probably in years to come, be ruined. Sometimes kids have the set blasting and that doesn't help their ears. Junk food is constantly advertised. It can stunt their growth or give them cancer.

Cartoons are a bad influence on children. Some kids believe it! I know a young boy who used to run into walls because he thought he was Captain Marvel. Also, shows like Bugs Bunny make kids think that hitting and jumping off cliffs is OK.

5-- Example #1

I agree somewhat, but I wouldn't completely get rid of it. We do watch too much television. My nephew is glued to the tube on Saturday mornings and doesn't even want to eat his breakfast. I myself don't watch as much as I used to. I'm too busy.

Television doesn't have all bad programs. Some of them are educational.

I'm not sure we would be healthier. I would rather go outside and play. My sister doesn't watch very much TV now that she's old enough to drive and go out on dates.

4-- Example #1

I disagree that we should get rid of TV. There are lots of good shows like 1-2-3 Contact, Sesame Street, and Mr. Rogers that teach us things. Fathers would not be able to watch the news or sports and housewifes would be made because they wouldn't be able to watch their soap operas. TV is great for a family to get together and watch a good movie.

Example #2

I agree and disagree. There is a lot of sex and violence on TV. Kids get a bunch of ideas, sometimes good, sometimes bad.

Kids spend too much time watching TV at night when they should be doing their homework. I have to finish my homework before the TV goes on.

On TV you can learn a lot about certain problems and how to deal with them. For example, on a show like Different Strokes...........

3-- Example #1

I disagree. TV helps people find out what's going on. It shows the weather and also has special educational programs...TV is watched by millions of people each day. I think it would be hard to take all the sets away. I would make kids grouchy and they wouldn't have much else to do but sit around their homework and twiddling their thumbs.

Example #2

I do agree, but I also disagree. Television is not all bad. There are some very educational programs, although some are definitely not. It is up to the parent and the child to decide which shows to watch. There is usually a channel on a television especially for educational programs.

As for being healthier, I totally agree. People without television are healthier. It is better for a child to find some thing creative to do, or to go outside. Being able to take this initiative on their own builds character and independence.

2-- Example #1

Watching TV hurts your and my eyes. You can not read very well. So that means your grades drop. And watching TV is bad for your health. I watch TV with my friends. Watching TV is some of my friends hobbies BUT NOT MINE! Watching TV is not really what I have planned when I get home from school. Playing outside is what I have planned when I get home from school. Not watching TV but sometimes I do. But not all the time....

Example #2

I agree? I watch TV a lot and eat sweets. I know that it is not healthy but I can't help it. My uncle even said TV is not healthy. But he just still watches it. If somebody would come and unplug our TV I would be mad. I love watching TV. I watch..............

1-- Example #1

I agree because some people stupid and some aren't. Some need to be educated and some don't. If people stop watching TV maybe they can get something done for a change. Some are educated but the rest just want to goof off and watch television. They just watch TV too much. And that's why they don't learn very much. If there were no television no one would be stupid......

ELEMENT 3: ORGANIZATION

Examples of Score Points from Student Essays

6-- Example #1

I agree that unplugging all the TV sets would improve our health, make us more independent and better our education..........

First of all, TV affects our health by.............. If we watch too much, then .... Also..................

Second, we would become more independent if.............. because........ We would be exercising.......... so...........

Third, we would learn more because..................

Therefore, we should unplug.................

Example #2

I agree and I disagree that......................TV can be harmful because................ It can cause .... and .... However TV can also be beneficial. Shows such as .... These shows help us to learn.............. So there are advantages and disadvantages to unplugging.................

5-- Example #1

TV can help us become better educated and healthier. We would all be much worse off...........

Educational shows like.......... are good because.......... My favorite one is 1-2-3 Contact. I really like the part where......... I really made me laugh.

Another good part about television is the way it shows us how to stay safe and healthy. Besides that......... So that's why TV shouldn't be unplugged.

4-- Example #1

If you try to unplug everyone's TV, it will be a disaster. For example, young children will not learn their ABC's. And they won't know how to......... Grown up will miss their detective shows and..........

There won't be anything for people to do. Since they are bored, kids will be on the streets, causing trouble. I suppose some kids might go the library, but not any of my friends. We would cause traffic jams because we play ball in the street.

Example #2

I agree with the statement. Turn off the TV and kids will do homework. Turn off the TV and they will get some fresh air. And another thing, they have better eyesight...... So get rid of TV.

3-- Example #1

I agree that TV is bad. Kids are hooked on cartoons. They always....... They should be studying and .... They don't get any exercise....... The stuff they show on TV is awful too. There is lots of sex and violence........ Like on.......... My mom says that these shows are terrible. I'm not allowed to watch them.

Example #2

I think we should leave TV alone. There are lots of good things to watch on TV. You'd have to be crazy to turn it off.

My favorite show is Magnum P.I. My mom likes the soaps and my dad watches the news to get the baseball scores. Old and young people see a different world through television. They see life as fantasy or reality whichever program they choose to watch. Without television some people would not be able to dream wish or express their feelings. But when abused, television can be as dangerous to ourselves and others as a gun, knife or any other form of weapon used to harm ourself or others.

2-- Example #1

Don't turn off my TV. I don't watch much television because I work nights and I am at school all day. I might watch it for a few minutes when I come in from school. If I'm not working I'll usually go hunting with my brother-in-law. On Sundays I go to church in the morning play football in the afternoon and then to to church at night. So I don't watch television very much. I usually watch the news if I'm at home.

Example #2

I agree, but I also like to watch television. And I like to read. If I did not have a television I think I could get along. But I also think television can be educational. There are good television and there are bad ones. When I get tired of television and go into my room and read a good mystery or something. My family has a lot of books. I like cartoons too...........

1-- Example #1

I disagree because some people don't care about their body and I disagree about unplugging our television sets and if we weren't caring about our body we would not be here now because if there weren't no television children won't have an education and some people children run the street about a small amount of people talk to television people about the children education they would start playing education movie on your television.

APPENDIX A.8

EXAMPLE OF A "6" PAPER

Writing Assignment

It always strikes me as a terrible shame to see young people spending so much of their time staring at television. If we could unplug all the TV sets in America, our children would grow up to be healthier, better educated, and more independent human beings.

Do you agree or disagree? Explain and illustrate your answer from your own experience, your observations of others, or your reading.

Television does have a bad effect upon the children growing up today. The problem, however, is not one of content but of the addiction some children have to television. It can be a good way to relax and have fun if watched in moderation, but some children reach the level of watching television five or more hours a day. Clearly this is an extreme: it interferes with studying, outside play, and the excercise each child needs everyday. Watching television ½ hr to 1 hr a day can be beneficial in releasing tension, but after a longer amount of time the child can not pry himself away from the t.v. set, and he loses sense of reality. Television tends to separate children from the outside world that they are preparing to live ~~in~~ on their own some day. Television is another world in the minds of children, and they are caught up in it.

Television reduces the creativity and imagination in children. They don't think for themselves - it does the thinking. They

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no longer have the ability to imagine new and different worlds - it imagines for them. Children are reduced to the mentality of the programs to watch; considering the low level of intelligence in programming today, it's no wonder that children are turning out less bright and imaginative. Watching t.v all day, they have no time to create for themselves.

Television shuts off the communication between children and their families and between parents. There is no longer a great deal of conversation between child and parent, all eyes are glued to the set. T.V. is the automatic baby sitter - the parent doesn't have to play, talk or read with the child when he is occupied with a t.v. program. A lot of loving attention is lost on both sides. People lose a great deal of personal contact watching television - no one wants to be bothered. Children are growing up without loving parental attention more and more, and that is why they are turning out worse and worse.

If less television was watched in America, more bright, happy children would result.

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APPENDIX B

GRAMMAR

Language Arts Objectives in Illinois Schools

The 1983 teacher survey was distributed to two teachers at the appropriate grade level (fourth, eighth, or eleventh) in each of the schools administrated. The scope of the language arts curriculum can only be briefly touched upon through a survey. However, some of the emphases incorporated in language arts can be identified in this way. The results provide a partial answer to the question, "What is being taught?"

Results reflect the choices of 244 fourth grade teachers, 223 eighth grade teachers and 236 eleventh grade teachers. Teachers were asked to identify how often a particular skill or aspect of knowledge was taught during a semester. The scale ran from "Not at all" to "11 or more times." In addition, teachers noted if the objective was taught as a specific activity or an "integrated" activity taught in conjunction with other objectives. By ranking each of 37 objectives based on teacher responses, the most commonly used objectives on the list were identified for this report.

Listening Skills

The most emphasized of the objectives related to listening.

The listening skills objective most emphasized in Illinois schools is following directions. This skill is considered so important at the fourth grade level that both specific activities to teach the skill and activities integrated with other objectives were implemented by a sizable proportion of teachers responding to our survey. By eighth grade, specific activities related to teaching following directions are no longer typical in schools. Following directions, however, is still important as a part of other objectives. Both eighth grade teachers and eleventh grade teachers report this to be an emphasis.

None of the other listening skills objectives listed in the survey obtained such a high degree of consensus among the teachers surveyed. Some agreement did occur about summarizing the main idea of an oral communication as an activity related to other objectives. This skill was emphasized by approximately two-fifths of fourth and eighth grade teachers and one-third of the eleventh grade teachers. Some agreement about a low degree of emphasis occurred at all grade levels for the objective, "Identifying the mood of an oral communication."

Speaking Skills

Two of the four objectives listed relating to speaking skills are emphasized at fourth, eighth, and eleventh grades -- "Expressing ideas informally," and "Participating in discussions." At the fourth grade, emphasis was both specifically designed and integrated with other objectives for both of these objectives, while at the eighth and eleventh grades, the emphasis for these objectives was as an integrated effort with other objectives.

Possible objectives related to types of speeches or presentations were not frequent choices. It may be that other speech activities are used or that speech is not a prominent portion of the language arts curriculum. For the teachers at the eleventh grade, student presentations for entertainment and persuasion were a low priority. These objectives were also a low priority for fourth and eighth grade teachers.

Study Skills

The response to objectives offered for teacher review which dealt with study skills suggests that there are differences in emphasis among fourth, eighth and eleventh grades. The only common study skill for all three grade levels is the use of dictionary skills. At the fourth grade level, the objective is both specific and integrated with other objectives, while at eighth and eleventh grades, dictionary skills are generally incorporated as part of other objectives. While dictionary skill is the primary emphasis at fourth grade, the use of reference materials is emphasized at eighth grade as an objective integrated with other objectives, but is not prominent as an eleventh grade language arts objective. Eleventh graders are expected both to utilize the study skills of taking notes and analyzing written communications.

Reading Skills

The most generally implemented reading skill is using content to decode new words. At fourth grade, this is taught both as a specific objective and integrated with others. At eighth and eleventh grades, it is generally dealt with in conjunction with other objectives. Eleventh grade teachers also indicated that identifying the main point in a written communication was a frequently implemented objective.

Writing Skills

The objectives that are emphasized which relate to skills used in writing are spelling, grammar, sentence and paragraph construction. At fourth and eighth grades, spelling and grammar are identified as both specific objectives and objectives combined with other objectives. By eleventh grade, these same objectives are taught most frequently as integrated with other objectives.

Attention to complete sentences occurs as a specific objective at the fourth grade level and as a combined objective at fourth, eighth and eleventh grades. Adding sentences together into coherent paragraphs appears as an objective incorporated with other objectives at grades four, eight and eleven.

Figure Emphasis on Objectives

Objective	Grade Levels		
	4	8	11
LISTENING SKILLS			
Following Directions (Integrated)	X	X	X
SPEAKING SKILLS			
Expressing Ideas Informally (Integrated)	X	X	X
Participating in Discussions (Integrated)	X	X	X
STUDY SKILLS			
Note Taking (Integrated)			X
Dictionary Skills (Integrated)	X	X	X
(Separate)	X		
Identifying the Main Point (Integrated)			X
WRITING SKILLS			
Spelling (Integrated)	X	X	X
(Specific)	X	X	X
Grammar (Integrated)	X	X	X
(Specific)	X	X	X
Sentence Construction			
(Integrated)	X	X	X
(Specific)	X	X	X
Paragraph Construction			
(Integrated)		X	X
Utilizing Topic Sentences			
(Integrated)			X

Once objectives are established, teachers devise activities for students. The frequency of twenty-three teaching practices was examined through responses to the teacher survey. Three types of activities are utilized across all grade levels (4, 8, and 11). These include writing paragraphs in class, writing about reading, and writing thought responses of a few sentences in length, and discussing the qualities of good writing.

APPENDIX C

ACT SCORES BY INCOME, ETHNICITY, AND YEAR OF TESTING

Appendix C

The analyses on student achievement in terms of ethnicity, income, and years of testing produced three tables, too lengthy to be included in the chapter. These tables are included in this appendix. The tables reflect the average student achievement in the school years of 1970-71, 1975-76, 1982-83, respectively. The reader should note that, in 1970-1971 the A.C.T. program clustered all Hispanic students under the category of "Spanish-American." Since that time, the A.C.T. program has two separate identifying categories, "Mexican-American" and "Puerto Rican." There is thus a slight change as one compares the results from table to table.

1970-72 Average ACT Scores by Income by Ethnic Group

	Income	English	Math	Social Studies	Natural Science	Composite
Black	Low	12.12	12.95	12.27	14.85	13.18
	Medium	13.51	14.29	14.17	16.03	14.63
	High	13.38	14.62	14.21	16.35	14.76
American Indian	Low	14.85	15.79	14.68	17.67	15.90
	Medium	16.97	19.12	17.69	19.48	18.45
	High	17.67	18.96	18.48	20.50	19.07
White	Low	18.55	19.68	19.26	20.88	19.72
	Medium	19.45	21.73	20.91	22.43	21.26
	High	20.13	22.75	21.85	23.25	22.13
Spanish-American	Low	12.92	14.51	13.87	16.10	14.50
	Medium	15.27	16.81	16.31	17.85	16.65
	High	14.10	18.47	16.16	18.29	16.95
Oriental	Low	13.76	17.08	13.25	17.14	15.44
	Medium	15.30	18.87	15.59	18.88	17.28
	High	15.97	20.39	17.41	20.70	18.76

1975-76 Average ACT Scores by Income by Ethnic Group

	Income	English	Math	Social Studies	Natural Science	Composite
Black	Low	10.71	9.71	9.29	13.28	10.87
	Medium	13.26	12.01	11.73	15.53	13.26
	High	15.27	14.54	14.06	17.73	15.55
American Indian	Low	13.83	13.63	14.03	17.36	14.88
	Medium	15.86	14.87	14.15	18.58	16.00
	High	16.06	17.27	15.98	20.23	17.93
White	Low	17.27	16.80	16.84	20.32	17.93
	Medium	18.38	18.89	18.11	21.71	19.40
	High	19.63	20.89	19.71	23.18	20.98
Mexican-American	Low	13.22	12.24	12.16	15.72	13.46
	Medium	14.83	14.96	15.07	17.95	15.82
	High	16.97	17.53	17.27	20.38	18.03
Oriental	Low	13.65	17.84	13.59	17.63	15.82
	Medium	16.08	19.17	15.84	20.25	17.94
	High	18.91	22.68	18.88	23.51	21.11
Puerto Rican	Low	10.46	10.31	9.21	13.43	11.00
	Medium	14.20	13.47	13.75	16.82	14.68
	High	18.64	19.33	19.61	22.61	20.19

1982-83 Average ACT Scores by Income by Ethnic Group

	Income	English	Math	Social Studies	Natural Science	Composite
Black	Low	11.82	8.53	10.35	13.82	11.25
	Medium	13.63	10.60	12.17	15.23	13.00
	High	15.14	12.43	13.66	1[illegible].63	14.60
American Indian	Low	13.25	10.06	11.60	16.02	12.90
	Medium	15.80	14.03	14.46	17.71	15.58
	High	15.78	14.81	15.16	18.86	16.28
White	Low	17.42	15.04	16.66	20.22	17.71
	Medium	18.49	17.74	17.88	21.34	18.99
	High	19.53	19.69	19.06	22.50	20.32
Mexican-American	Low	13.31	11.31	12.46	15.88	13.36
	Medium	14.42	12.50	13.75	17.13	14.57
	High	16.33	14.87	15.81	19.08	16.65
Asian-American	Low	12.16	16.78	10.96	16.11	14.13
	Medium	15.62	19.81	15.31	19.48	17.68
	High	19.93	22.48	19.70	23.29	21.48
Puerto Rican	Low	12.01	9.51	11.15	14.59	11.94
	Medium	14.49	12.27	13.50	16.81	14.38
	High	17.07	16.73	16.87	19.75	17.74

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